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# ELEMENTS OF SURGERY.

BY

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THIS WORK  
IS MOST RESPECTFULLY INSCRIBED  
TO THOSE GENTLEMEN WHO HAVE STUDIED,  
AND ARE STUDYING,  
SURGERY,  
IN THE ROYAL INFIRMARY OF  
EDINBURGH.



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## P R E F A C E.

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THE rapid advancement made in the Pathology and Treatment of Surgical Diseases demands a perpetual revision and correction of the systematic works devoted to this department of the healing art.

Accordingly, Text Books, various in merit and extent, have emanated from the different Schools. Several of these have, by successive editions, kept pace with the Science; whilst others have fallen into disuse.

In this part of Britain, the Systems of Latta, B. Bell, and Allan, occupied the field; but it being now vacant, I venture to supply the deficiency, by reducing the heads of my Lectures into a Compendium, or Guide, for those Students who resort to this city.

It must appear superfluous to preface such a work by Anatomical Descriptions, Anatomy being now studied more generally, and with greater zeal, than heretofore. Pathology also is more attended to, and better understood. To which circumstances are to be ascribed the improvements in Surgical Science, as well as in the art of operating.

The functions and structure of parts are more frequently preserved uninjured—mutilation is more rarely required—and operations are dispensed with. The wider the extension of Pathology, the fewer the operations will be—thus affording the best criterion of professional attainment. Who will question, that there is more merit in saving one limb by superior skill, than in lopping off a thousand with the utmost dexterity?

To treat surgical diseases as they ought to be treated, the practitioner must be thoroughly acquainted with the healthy and morbid structure; he must also have a mind vigorous

and firm from nature, well instructed in the best precedents, and matured by observation.

Years are not the measure of experience. It does not follow, that the older the Surgeon is, the more experienced and trustworthy he must be. The greatest number of well-assorted facts on a particular subject constitutes experience, whether these facts have been culled in five years or in fifty.

It is only from experience, directed and aided by previous study, that accuracy of diagnosis and celerity of decision can be acquired. Besides knowing in what manner to proceed, the Surgeon must know well wherefore he acts, and also the precise time at which he should interfere. With knowledge and confidence derived from experience, he will perform such operations as are indispensable for the removal of pain and deformity, or for the preservation of life, with calmness and facility—with safety to his patient, and satisfaction to those who assist in, or witness, his proceedings.

Attention to the apparatus is necessary. It

should be in good order, simple, and ample. The young Surgeon should note down, previously to an operation, whatever, on reflection, can possibly be required. "For in most capital operations, unforeseen circumstances will sometimes occur, and must be attended to; and he who, without giving unnecessary pain from delay, finishes what he has to do in the most perfect manner, and that most likely to conduce to his patient's safety, is the best operator."

It is seldom necessary to employ much preliminary treatment. From the usual preparative course of bleeding, purging, cooling diet, &c. patients about to undergo capital operations, as lithotomy, suffer more than they can gain.

It is of the utmost importance to attend to the state of the patient's mind and feelings. He ought not to be kept in suspense, but encouraged and assured; and his apprehensions must be allayed. If this cannot be effected—if he is dejected and despondent—talks of the



great risk, and of the certainty of his dying, it is better that the operation be abandoned, or at least delayed. If, on the contrary, he is confident in the resources of his constitution, and in the ability of his attendant, and looks forward to the advantage to be derived from his own fortitude, then should there be no delay.

A mild laxative may be given, when an empty state of the bowels is desirable, or when they, by acting too soon afterwards, might put the patient to inconvenience or pain, or interrupt the curative process.

Attention to after treatment is of much greater importance. The Practitioner is not to rely on success, however well the manual part has proceeded. He must consider his labour only begun, when the operation is finished; the patient is yet to be conducted, by kindness and judgment, through the process of cure.

It is thus only that difficult and unpromising

cases can be brought to a happy conclusion, and favour and lasting reputation gained.

In the present work, an endeavour has been made, in the first place, to lay down, correctly and concisely, the general principles which ought to guide the Practitioner in the management of constitutional disturbance, however occasioned.

The observations introduced to illustrate the doctrines inculcated, are given as briefly as is consistent with an accurate detail of symptoms and results. The descriptions of particular diseases have been sketched and finished from nature; and, it is hoped, with such fidelity, that their resemblance will be readily recognised.

To describe all the methods recommended and followed, in the different Surgical operations, would occupy more space than can be allotted in an elementary work—would, without answering any good purpose, lead into the wide range of the History and Progress of Surgery.

Such modes of operating are described, as have been repeatedly and successfully performed by the Author.

If by clear and simple description of the phenomena attendant on morbid action, and of the changes which it produces,—if by plain rules for the treatment of the diseases, and performing the operations for their alleviation or cure,—he contributes to the progress of Surgery, and the consequent diminution of human misery, he will consider himself fully rewarded for the time and the labour spent on this production.



# ELEMENTS OF SURGERY.

## PART FIRST.

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### ON INFLAMMATION.

**T**HERE are few accidents or diseases, to which the human body is liable, which are not preceded or followed by incited action of the blood-vessels; and the phenomena require to be most attentively studied, and correctly understood, by those who purpose practising the healing art.

As all the salutary as well as diseased processes which occur in the body, are more or less attended or affected by this action, and as the regulation of it forms a principal part of the duty of the Surgical practitioner, this work may properly be commenced by the treating of it and its consequences. The more violent degrees of incited action come to be considered under the head of *Inflammation*.

Inflammation may be defined, an unnatural or perverted action of the capillary blood-vessels of a part,

attended with redness, throbbing, swelling, pain, and heat, as well as more or less disturbance of the constitution.

Every part of the body is liable to inflammation; and some writers have hence divided inflammation into different kinds, according to the particular tissue which it chiefly involves. But the action appears to be always of the same character, though *modified* by various circumstances, such as the tissue in which it occurs, the state of the constitution, the exciting cause, the intensity of the action, &c.

The usual division of the subject, into *Acute* and *Chronic*, is that which it is here proposed to adopt.

The term *Chronic Inflammation* is more properly applicable to a consequence of the *Acute*: but it is at the same time true, that morbid actions proceed more slowly in some constitutions, and in some parts of the body, than in others; and that changes of structure occasionally occur, without the prominent symptoms of inflammation being experienced by the patient, or detected by the practitioner.

The term *Morbid* is used in contradistinction to what is called *Healthy Inflammation*; but inflammatory action is generally connected, more or less, with a diseased or disordered state of some part of the body. In many circumstances it is highly necessary that a certain degree of incited action of the vessels should occur, and continue for a certain time; as during the uniting of fractures, the adhesion of wounds, and the healing of some sores—and thus far it is healthful: when, however, it advances to inflamma-

tion, it must, for this reason, be considered morbid, that it frustrates the healing process of nature.

The first *symptom* of inflammation to be considered is *Redness*; this is observed only on the surface of the body, or at the extremities of those canals which terminate externally.

The inflamed conjunctiva affords a conspicuous example of this appearance. And, in a subject that has suffered from an internal inflammatory attack, a good opportunity is frequently afforded of observing the enlarged and injected state of the vessels on which the red colour depends. But inflammation may have existed to a certain degree, and yet the parts may be pale, from the capillaries having emptied themselves into the veins immediately after the patient's death. The paleness may be also in part caused by the influx of the red globules being impeded immediately after death, or when the patient is *in articulo mortis*, in consequence of the contraction of the vessels, which is well known to occur at that period.

But it must also be noticed, that redness is not *essential* to inflammation; for serous vessels may be altered in size and function by this action, and yet not be sufficiently dilated to receive the red globules of the blood,—as is exemplified in inflammation of the arachnoid membrane of the brain, and slight inflammation of the cornea, &c.

But, again, serous vessels may be enlarged, so as to admit the red globules; and a part that is colourless when in the healthy state, may assume a highly red hue when in an inflamed condition. This may

be observed also in the cornea lucida, which, when violently inflamed, is pervaded by numerous vessels conveying red blood, ramifying over the whole of it, and freely inosculating with each other. Some have supposed that these vessels are newly formed, in consequence of inflammatory action. This opinion is erroneous; as the vessels existed in the cornea previously, and are only increased in size, so as to admit a fluid which they were formerly incapable of receiving. The speedy, and in many cases instantaneous, appearance of red vessels, where they could not previously be observed, decidedly overturns the opinion that new vessels are in such a case formed. New vessels are seldom formed, unless after a breach of structure, or in cases where morbid deposits become vascular.

*Throbbing*, to a greater or less degree, is always felt in an inflamed part by the patient; and it is frequently so distinct, as to be readily perceived by an attentive examination. The sensation of throbbing is not produced by the action of the capillary vessels alone, but chiefly in consequence of the larger trunks in the neighbourhood sympathizing with these capillaries, and so having their action also increased. In fact, when the inflammatory action is extensive or severe, or when the part affected is of much importance to life, the whole circulating system is disturbed, and thus arises the sympathetic excitement of the constitution.

The incited action of those vessels in the more immediate vicinity of the inflamed part, is well marked



in cases of Paronychia or Whitlow. There the digital, the radial, and ulnar arteries, with their branches, beat more violently than usual; and with much greater force, though not more rapidly, than the vessels in other parts of the body.

*Swelling* is caused by the enlarged and overloaded vessels relieving themselves by *effusion* of part of their contents into the cellular texture. The effusion varies in extent and consistence, according to the degree of inflammatory action, the nature of the matter which escapes, and the species of resistance afforded. *Cæteris paribus*, the greater the resistance, the less is the effusion, and the more violent is the inflammatory action, and the chance of its speedy and favourable termination is the more diminished. Even the enlargement of the blood-vessels produces a slight degree of intumescence previous to effusion. This effusion, or relief to the vessels, giving rise to swelling, when it occurs in loose cellular tissues, may be considered as a beneficent provision of nature. But in vital organs, it may be productive of the most serious consequences; as in these, very slight effusion will often endanger the structure of the organ, destroy its functions, and not unfrequently be attended with fatal consequences.

The nature of the effused fluid varies according to the degree of violence and advancement of the action, and is also modified by the texture in which that action occurs. It may consist of SERUM, LYMPH, or BLOOD. In inflammation, in short, exhalation appears to be much increased, whilst the powers of

the absorbent vessels are diminished, or at least do not maintain their proper relation to those of the exhalants.

*Pain* is the next symptom enumerated. Here, I must mention a very common error of supposing that where there is pain, there must always be inflammation. Some diseases attended with the most acute pain, as Tic Douloureux and Cramp, are frequently unattended with inflammation. Many chronic diseases, too, are accompanied with violent and long-continued paroxysms of pain, without excited circulation of the part.

This erroneous opinion may be productive of highly prejudicial effects, as—the exhausting, by copious depletions, the vital powers of patients already very feeble—the consequent aggravation of the urgent symptoms—and, the then only termination of the disease and of the practice, death.

Again, it is true that we must bleed, in some cases, with the view of *preventing the occurrence* of inflammation; yet the prophylactic treatment may be carried too far, as in cases of violent injuries, or after severe operations. In these instances, the immediate abstraction of blood, so far from being beneficial, expedites the dissolution of the patient, or at least greatly retards the cure. Pains arising from local irritations are often treated in a similar way, whilst the removal of the cause would be much more likely to restore the natural action of the parts.

Though inflammation does not always accompany the sensation of pain, yet the latter, in a greater or

less degree, attends inflammatory action ; and perhaps it is fortunate that it does so. Because, were it not for the occurrence of pain, the patient's attention would not be directed to the disease ; he would use the part as if in health, and the affection would be much aggravated. Whereas, according to the existing provision of nature, pain is felt at the commencement of the action, the presence of which the patient is thereby made aware of, and compelled to employ such measures for its removal as reason naturally dictates, of which none is more effectual than disusing the affected part.

The nerves are thus the safeguards of the various parts of the body in health—their nurses in disease. A part deprived of sensation may be used, even to the destruction of its texture, without producing any impression on the sensorium, and consequently without the animal being conscious of it.

The presence of pain, as a symptom of inflammation, may be easily explained. The connexion of the vascular with the nervous system is very constant and intimate. Their ramifications accompany each other, and are contained in the same cellular sheath ; and without the reciprocal influence of each, neither could perform its functions perfectly. By injecting a limb soon after its separation from an animal, and before its vital heat has departed, spasms of the whole muscles are produced ; showing the intimate connexion between these two systems. This, however, is distinct from the contractions of the muscular fibre produced by the application of stimuli. In

the former case, the contractions are universal, and induced through the medium of the nerves. In the latter, the *irritability* of the fibre is excited.

When the circulation is excited, the nerves accompanying the affected vessels are unusually compressed, and perhaps overstimulated by the circulating fluid, in which some change appears to take place; and in this manner unnatural impressions are produced. Overdistension of the coats of the vessels may also be supposed to give rise to painful feelings, independently of any affection of the accompanying nervous trunks.

The degree of pain is generally in proportion to the sensibility of the part when in health; it also depends upon the distensibility of the parts affected, and on the intensity of the inflammatory action. When bones, tendons, &c. which in their uninflamed state are nearly insensible, become inflamed, the pain and suffering are most excruciating, owing to the resistance opposed to the dilatation of the vessels, and the prevention of the effusion by which they naturally relieve themselves.

The *kind* of pain also varies in consequence of different modifications in the action, causing different impressions on the sensorium. Pain is not always increased in proportion to the natural sensibility of the part; for in some instances the sensibility is rendered much more intense, whilst in others it is much obtunded.

The last, and, according to some writers, the only unequivocal symptom of inflammation, is HEAT.

In extravasation of blood into the cellular texture, as under the conjunctiva, there is redness, swelling, and occasionally pain ; but at first, and unless the action of the blood-vessels be excited, there will be neither heat nor throbbing. In many internal inflammations, heat is much complained of ; and in Enteritis, it has been considered a pathognomonic symptom.

The symptoms and consequences of inflammation—and amongst others, heat—are modified by the distance of the affected part from the centre of circulation. All actions, healthy as well as morbid, proceed with more vigour in the superior extremities,—the head, the neck, and the trunk,—than in the more remote parts of the body ; for to the former the blood is transmitted more speedily if not in greater quantity, and is not so liable to be impeded in its return. Hence an arm may bear up under a severe injury, which, to an inferior extremity, would prove inevitable destruction. Heat, however, in an inflamed part, is to be regarded rather as a *sensation*, than as an absolute increase of temperature. For it has been proved by the most decided experiments, on the temperature of the mucous canals of animals, first when in health, and again after violent inflammation had been excited, that little or no variation of temperature can be observed.

The effects of an incited action of the vessels on the system at large, must now be adverted to ; or, in other words, that general disturbance in the system which attends inflammatory incitation, and occurs in a degree proportioned to the power of the exciting

cause, and the kind of texture primarily affected. The functions both of the sanguiferous and nervous systems are deranged, producing a state termed Symptomatic or Sympathetic Inflammatory *Fever*. All the secretions and excretions are diminished or suppressed; and hence the hot, dry state of the skin, the thirst with foul and dry tongue, the urine scanty and high coloured, and the constipation of the bowels. This last symptom, however, though it may arise partially from the diminished secretion of mucus, yet is often dependent on disturbance of the functions of the brain and nerves. The pulsations of the arteries become rapid and strong, the sanguiferous system being unable to relieve itself by effusion in consequence of the obstruction of the exhalants.

If the extreme vessels are in any way obstructed, and the general circulation in consequence much accelerated, the internal viscera become oppressed, and are interrupted in their functions; and relief is experienced only when relaxation occurs in the vessels upon the surface of the body. Thus, in any violent exertion, there is a sense of oppression in the chest, and the functions of the encephalon are somewhat disordered, but as soon as perspiration breaks out, the relief is instantaneous, and the animal can, without difficulty, continue its exertions.

In inflammatory fever, the breathing is often difficult, and the appetite declines; the patient is restless and watchful, and when he does sleep, he is not thereby refreshed.

In the more violent cases, the sensorial functions

are much disturbed ; even delirium supervenes, with muscular exertion and violent convulsions, and may be followed by coma, should the local affection not subside.

The delirium attendant on violent diseases and accidents may often be considered a beneficent effect of nature's operations ; for the patient, frequently losing all consciousness of his situation, seems to be under the influence of the most pleasing hallucinations, and is freed from the more lamentable state of severe mental as well as bodily affliction.

Writers on Inflammation have expatiated at great length on Sympathies ; and these have been divided into, 1st, The *Partial*—the Remote, the Continuous, and the Contiguous ;—Remote, when parts sympathize, though situated at a considerable distance from each other ;—Contiguous, when the sympathetic action seems to be produced, in separate parts, merely from juxtaposition ;—Continuous, when the action extends in parts which are of similar texture, and conjoined, with that which is primarily affected.—2d, *Universal*, where the whole system suffers along with parts of it. For instance, the whole system is often disturbed by a deranged state of the alimentary canal, and again the bowels, the skin, the brain, the osseous or any other of the textures, may suffer from a general disorder.

The system sympathizes much more with some parts than with others ; and we accordingly find that disorder in one part will give rise to alarming constitutional excitement, whilst in another, a much greater

derangement in function and structure will apparently be almost entirely disregarded by the constitution.

*Irritation* is an effect of sympathy, and differs from inflammation, inasmuch as the functions of the nervous system, and not those of the sanguiferous, are disturbed ;—the latter frequently supervenes on the former. Irritation is local, or constitutional. As examples of the strictly local species, may be mentioned that peculiar and dreadfully annoying sensation produced in the alveoli by the presence of a diseased tooth, or the irritation caused by ascarides in the rectum, or by stone in the bladder.

But from this action being dependent on the nervous agency, irritation is frequently produced in a part remote from the source of the action. Thus, if an irritating cause of any kind be applied to the origin of a nerve, the effects of the irritation may be evinced in a part supplied by its extreme branches ; while, if the cause is applied to the termination of a nerve, a similar action is produced at its commencement, and in parts supplied by nerves from the same origin. Thus, disease of the hip-joint causes pain in the knee, whilst dentition in children not unfrequently produces fatal effusion at the base of the brain ; and again, irritation at the neck of the bladder frequently gives rise to pain in the feet.

Local impressions, injuries, or irritations, though apparently of little importance, frequently produce irritation which affects the whole system, and is therefore termed *constitutional*. Syncope sometimes follows the introduction of a bougie along the urethra.



We meet with too many instances of constitutional irritation following severe injuries or operations, especially if attended with much hæmorrhage. In general, there is considerable prostration of strength; the patient is anxious and restless; his sleep is disturbed; the pulse is weak and fluttering, occasionally intermittent; the tongue is white and loaded; the appetite is gone; the stomach rejects the little food which the patient is able to take; he is startled and annoyed by the slightest external impression. It generally happens that at this period of the disorder rigors occur, followed by a sense of heat, and by perspiration; and that the above symptoms gradually decrease, and the patient recovers; but in certain instances his breathing becomes quick and somewhat oppressed, attended with a peculiar spasmodic elevation of the nostrils; all the secretions are diminished, the intellectual functions become impaired, and there are occasional convulsive twitchings; coma supervenes, preceded by a low muttering delirium, and followed by death.

This action, as well as every other, is much modified by the importance of the part which is the source of the action, and by the constitution of the patient.

It is more severe in children than in adults. The affection will be more fully detailed, when treating of local injuries, and the management of patients after severe operations.

The *Causes* of Inflammation come next to be considered; and first, of the proximate cause or theory.

The different states of the Vessels in their healthy, and in their incited condition, have given rise to much discussion.

In the first place, considerable difference of opinion exists as to the relative share which the heart, the larger arteries, and the capillaries, occupy in propelling the circulating fluid in a state of health. Some physiologists are inclined to attribute the principal power to the heart, the blood being propelled and returned almost entirely by the *vis a tergo*; while they suppose that the arteries possess merely a degree of *elasticity* or *tonicity*. No fact seems to be better established, than that the arteries possess a muscular or contractile power, and that they act, more especially the capillaries, independently of the heart in carrying on the circulation. The arguments, however, stated by those who maintain a contrary doctrine, and the strong objections to which they are liable, may be briefly mentioned.

It is said, that muscular fibres have never been detected or shown in arteries.

To this it may be replied, that in many subjects fibres, remarkably strong, and apparently muscular, may be seen, whilst in others they are finer and less distinct. *Fibres*, however, can *always* be perceived, and the question can be only as to their being muscular. In those cases where resistance has been opposed to the circulation by aneurisms, tumours, or other obstructions, the middle coat of the artery will uniformly be found much increased in thickness.

This enlargement of the middle coat is still more

remarkable in arteries which have been obstructed by ligature, or which are beginning to be obliterated; distinct, uniform rugæ, disposed transversely, being observed on the internal surface, above the constricted point, and accurately corresponding to the transverse fibres of the artery.

The contractile, or muscular coat, becomes stronger and more distinct as the arteries extend farther from the centre of circulation.

But even though muscular fibres could not be distinguished, still we are not thence to conclude that they do not exist. Muscles differ much in appearance in different parts of the same animal, as is exemplified when we compare the fibres of the deltoid with those of the middle coat of the intestines; and in certain animals that evidently move themselves by a muscular power, nothing resembling the usual fibrous structure can be perceived.

It has been said, that arteries possess no contractile power; but this opinion is overturned by many phenomena both in health and in disease. The arteries always accommodate themselves to the contained fluid, as practitioners daily discover by the state of the pulsations. They contract on the application of stimuli, as electricity and sharp-pointed instruments, and what suits equally our argument, though not to be so easily explained, they contract also on the application of cold; for instance, cold cloths are frequently effectual in stopping secondary hæmorrhage after operations, or hæmorrhage from the mucous surfaces. With the exception of the cautery and pressure,

the ancients had no other means of suppressing bleeding from even the larger vessels, than astringents, stimulants, and cold. We often see a small artery pouring out its contents at the commencement of a surgical operation, and yet when we come to search for it, no hæmorrhage can be perceived from that quarter. It must be admitted, that this termination of the bleeding is, in a great measure, owing to the contraction of the mouth of the vessel. But it frequently happens, that after the patient has been put to bed, the vessel again discharges its contents; and here we have a distinct proof of the relaxation of the coats of a contracted artery.

Because the muscular coat of arteries is not of a florid colour, and not immediately obedient to certain stimuli, and because fibrin has not yet been discovered by chemical analysis, many have denied their muscular contractility, although many facts distinctly prove that they do possess this power. The dispute, however, seems to be more about *Words* than *Facts*.

Although fibrin has not yet been discovered in the middle coats of arteries, still it is to be remembered that animal chemistry is confessedly in its infancy, and that hence no conclusion can be drawn from this circumstance in support either of the one doctrine or of the other.

The muscularity of the middle coat has also been denied, because it does not seem continuous with the substance of the ventricle of the heart. This is unworthy of serious refutation.

It has also been objected, that the circulation is carried on when the arteries are rigid in consequence of calcareous degeneration, and cannot assist in the propulsion of the blood. But when the arteries, throughout the whole extent of a limb, are so changed in structure as not to assist in the circulation of the blood, death of the part is the inevitable consequence.

The muscular power of arteries may be deduced from the following facts and observations.

The larger arteries, after death, are always found empty. Even after respiration has ceased, the capillaries remain active, and contract so as to empty themselves into the veins. It has been alleged that other causes may operate in producing this empty state of the arteries—the *vis a tergo*, and a supposed pumping action of the heart; but consideration of such causes need not detain us.

The contractile power of the heart is frequently much diminished by organic disease, without affecting, to so great an extent as might be expected, the circulation of the blood in the remote vessels.

The heart is altogether wanting in some classes of animals; and human monsters are occasionally born, and live for some time, without this organ—still the blood is circulated.

The different parts of the sanguiferous system may be, at the same moment, in different states of excitement—a common example of which is the sudden blush of shame, or the pallid hue of terror.

The secretions are all formed from the blood; yet

we find the secretory organs not only differing from one another in secreting power, but each exhibiting alternate periods of repose and activity. It has been long known, and universally admitted, that the vessels supplying an active organ are unusually loaded with blood. The question then arises, What is the cause of the greater influx of blood? Can the heart instantly direct a stream of blood to any organ that may require it, without at the same time transmitting a corresponding increase to all the others? Such a supposition is evidently absurd.

These, and many other phenomena of the animal economy, are quite inexplicable, unless we admit that particular vessels have the power of dilatation and contraction, of directing and impelling the blood to particular organs; and if certain arteries have this power, how can we refuse a like power to the whole of the arterial system?

Alternate contraction and dilatation do not seem to occur to any great extent, however, in the larger arteries, during healthy circulation, nor is it necessary that it should; and though they are capable of dilatation, and may be called on to dilate or contract under some circumstances, yet the circulation is occasionally maintained for a considerable time, when these vessels are almost incapable of such action.

Independently of muscular action, the arteries may greatly influence the distribution and speed of transmission of the blood, by enlarging and diminishing their calibres; that is, by merely becoming larger and smaller conduits.

Considering the arteries, then, as muscular tubes, performing an indispensable part in the propulsion of the blood, we will now briefly consider their state in inflammation.

Passing over the different theories of *error loci*, spasm, &c. which have at various times been entertained, let us first examine the condition of the capillary vessels, for these are primarily and principally concerned.

The balance of the circulation is destroyed, but a diversity of opinion has existed as to the precise nature of the change which occurs. It has been supposed that the circulation is much accelerated in the capillary vessels of an inflamed part; but it has been satisfactorily proved by experiment, that after inflammation is fairly established, the blood circulates more slowly than in the healthy state of the vessels. When a part is excited, the circulation is accelerated, and a greater quantity of blood is transmitted by its vessels; but if the excitement is speedily removed, they recover themselves, though perhaps a little dilated, and no inflammation ensues. But if the exciting cause is applied for a sufficient length of time, the extreme vessels lose their contractility, they are weakened, become dilated, and the contained blood circulates slowly. When inflammation is fairly established in a part, the capillaries become considerably dilated, but there is no proof, that this change is in any way connected with debility. It is probable that the permanent dilatation occurs in consequence of the larger vessels in the immediate vicinity being in-

cited, and propelling more blood into the minute capillaries than they can readily return into the corresponding veins, and so great a degree of distension being produced, that the vessels are incapable of again speedily contracting. These larger trunks propelling blood into the distended and comparatively inert capillaries, which are incapable of transmitting into the veins the same quantity of fluid which they receive, will cause the throbbing or pulsating sensation.

In inflammation, it appears that a denser and darker-coloured blood is admitted into the vessels, and that red blood passes into arteries which could not receive it previously. The part, if transparent, becomes opaque—there is redness, pain, throbbing, swelling, and heat,—in fact, inflammation is established; and though the cause be now removed, the consequent action will run its course. The blood circulating in the part is changed in quality; it is redder, flocculi appear floating in it, and the globules disappear. These last may have been broken down in passing to the minute vessels, or partial decomposition may have taken place from a loss of vital power in the vessels themselves.

It is more probable, however, that the globules are merely condensed, for whenever motion is produced in the fluid, they speedily reappear. The alteration in the component parts of the blood seems to depend upon the previous state of the inflamed vessels in which it is contained; for it soon reassumes its natural appearance, when brought into a healthy



vessel, as has been proved by numerous experiments made on the webs of the feet of frogs. We may also conclude that the blood of an inflamed part undergoes chemical changes; for when the part becomes gangrenous, the blood then loses its red colour, and assumes a yellowish-brown hue, which necessarily implies an alteration in its chemical constitution. It seems not unlikely, that the change which is early observed in the appearance of the blood of an inflamed part, is the commencement of a chemical process, which, if the vessels do not regain their contractile power, terminates in the total destruction of the ordinary properties of that fluid. It is probable that the more modern speculators in medical science have paid too little attention to the state of the fluids, and to the fact, that, when diseased action occurs in a part, its secretions and supplying fluid are very considerably changed.

But the blood in inflammation also undergoes a change, observable after its removal from the circulation, and especially when the system sympathizes with the part affected. The blood does not coagulate so quickly as in the natural state, or else the red globules, being increased in specific gravity, fall rapidly to the lower part of the containing vessel, so that a yellowish crust appears on the surface of the crassamentum or clot; and this appearance is termed the inflammatory or buffy coat. In certain states of inflammation, this crust is also much contracted, so that its marginal circumference is at a considerable distance from the sides of the containing vessel; its

margins also are elevated and inverted; its upper surface is smooth, whilst the under adheres firmly to the coagulum; and in this state the blood is said to be *cupped*, as well as *buffed*. The appearance of the *buffy* coat is not peculiar to the inflammatory state; it frequently presents itself in blood removed from the circulation during pregnancy, and in several other conditions of the system, apparently altogether unconnected with inflammatory excitement. In these circumstances, however, the contracted or cupped appearance of the coagulum is hardly ever observed. An ignorance of the above fact leads to dangerous practice, inasmuch as certain practitioners will bleed and continue to bleed for very equivocal inflammatory symptoms, conceiving themselves fully warranted in so doing by the presence of the buffy coat. This coat is often not so apparent in the blood first drawn, as in that afterwards abstracted.

In inflammation, as was formerly remarked, the blood not only flows into those vessels which were previously incapable of receiving all its component parts, but it also escapes from the vessels, or is *extravasated*; and this may occur with or without rupture of the vessels; and to a greater or less extent, according to the violence of the action, and the texture of the part.

When local inflammatory action exists to a considerable degree, the general circulation is more or less disturbed. The heart, and the larger vessels supplying the capillaries which are more immediately concerned in the local action, subsequently

sympathize with the part affected, and, acting with greater vigour than usual, propel the blood into the extreme branches ; so that the inflammatory excitement may be said to be gradually communicated by the continuous sympathy, till the whole sanguiferous system become subject to its influence. The degree of this general excitement depends greatly on the texture and function of the part primarily affected.

The term *Passive* Inflammation has been applied to that state in which the larger vessels are not excited, or have ceased to sympathize with the capillary branches.

The term *Chronic* Inflammation is properly limited to the consequence of the acute inflammatory action, the part remaining turgid and swollen, and the vessels over-distended with dark blood, but with little or no pain, and without heat or throbbing. *Congestion* is also employed to denote fulness of the vessels, large as well as small, when no sign of excited circulation, or of decided inflammatory action, has occurred. It is most frequently used, however, when describing the condition of an internal organ. An overdistension of a particular set of vessels may certainly exist, as a consequence of inflammation, or altogether unconnected with it, and still be unattended with inflammatory action. These two states ought to be carefully distinguished from a similar condition of the vessels, attended with inflammation ; for practice, which would be beneficial in the one case, is highly prejudicial in the other. Lamentable examples of the nonattention to this distinction are every day observed.

It may here be mentioned, that some have denied the existence of vitality in the blood; and to some minds it may perhaps be difficult to conceive how a fluid should be possessed of this principle. But no one can either doubt or deny that the blood, in its distribution, in its manner of receiving increase, in its secretions, and in its various morbid changes, is governed by certain laws and principles which cannot be explained by those of chemistry or mechanics, but must belong to some other power. The phenomena, also, with which it is endowed, do not occur in the dead subject.

It is allowed, and has been promulgated by all authors, that the blood is one of the most active agents in the animal economy,—in repairing waste, in affording peculiar fluids necessary in that economy, in supplying organs with materials for carrying on their functions, &c.; and yet all this, according to some, is accomplished by a *dead* animal fluid; no one can plausibly object to the laws by which the blood is governed, being referred to the Power of Life, or to their being called Vital Principles.

Certain circumstances give rise to inflammation, and have been called its *Exciting* or *Immediate Causes*. Among the external applications producing inflammation, stimulants bear a conspicuous part; the effects of which in causing this action, are well shown by many experiments that have been performed on the lower animals; by the application of ammonia, for example, to the diaphanous web of a frog's foot. As stimulants usually causing inflammatory action, by

their being applied to the surface of the body, may be enumerated, acids, alkalies, certain salts, animal substances such as the cantharides, the juices of many plants, many poisons, an excessive degree of heat, &c. Any solid substance, though by no means acrimonious in its quality, may act as an exciting cause, as by pressure or friction.

Wounds also, especially when of considerable size, and occurring whilst the constitution is in an unhealthy condition, give rise to local, and occasionally general, inflammatory action.

This action is besides frequently produced by injury from an obtuse body causing a bruise or fracture; by the lodgement in a part of extraneous substances, or of decayed portions of the system,—such as portions of bones, tendons, &c.; or by irritating matter generated in the system itself, by concretions, tumours, vitiated secretions, &c.

One of the most frequent causes of inflammation is *cold*; the action of which, however, cannot always be readily explained. In some instances, it appears to act *directly* on a part, as in inflammation of the mucous membrane lining the organs of respiration: in others, its action is *indirect*; probably by disturbing the equality of the circulation, the inflammation occurs in a part distant from the surface the temperature of which had been diminished; and in the great majority of instances in which inflammation has occurred, in consequence of very intense cold, it is produced by the sudden application of heat whilst the temperature of the part is greatly below

the natural standard, as will afterwards be more particularly illustrated. But the inflammatory action may be produced, even though no heat be afterwards applied directly to the part, by its vessels being too rapidly brought into a similar degree of action with those of the surrounding parts which are in their natural condition. Sudden and general diminution of temperature seems to act as an exciting cause, by producing an instantaneous suppression of the transpiration. Another exciting cause of inflammation, is the retention of the secreted fluids, causing unnatural distension of canals or cavities, and is exemplified by cystitis occurring in consequence of retention of urine. Certain states of the constitution are justly supposed to excite inflammation, in particular textures. Other exciting causes of inflammation might be enumerated, but these will be more naturally explained, and more fully considered, whilst treating of inflammation of the various tissues and organs. Their effects are various and diversified, according to the intensity of the cause, the structure, function, and sympathies of the part affected, and the state of the system. And it is also to be remembered, that not unfrequently inflammatory action appears, whilst we can assign no cause for its production.

Inflammation is said to *terminate* in *Resolution*, *Suppuration*, and *Mortification*. The application of the word termination, however, is injudicious; for in general the inflammatory action is not suspended by the occurrence of suppuration or mortification, but continues in the surrounding parts with unabated

intensity; and not unfrequently several of the terminations occur combined with each other.

*Adhesion* has also been mentioned as a termination of inflammation, but perhaps improperly; for, although, in certain parts of the body, as in the serous cavities, adhesion is produced in consequence of inflammatory action, and during its progress, still the process of adhesion is altogether independent of this action in other textures, such as the cellular. In the uniting of a flesh wound, a certain degree of incited action of the blood-vessels is necessary for the accomplishment of the adhesive process; but should that incited action rise to inflammation, the union by the first intension is interrupted, and the wound must heal by suppuration and granulation. Adhesion will be more properly attended to when treating of wounds.

The various terminations of inflammation are salutary or destructive, according to circumstances; but resolution is, in general, the one most to be desired; although, after the inflammatory action has attained a certain point, this cannot be expected to occur.

Resolution takes place when, in consequence of the increased action in the larger arterial trunks being diminished, the affected capillaries receive a smaller supply of blood, and transmit it more easily into the corresponding veins; and when they are thereby less dilated, and consequently enabled to resume their contractile power. The circulation in the part becomes again natural, and the circulating fluid also resumes its healthy properties, the redness and sensation of throbbing are gone. From the non-dilatation of the

blood-vessels, the nervous system is not preternaturally stimulated, and thereby the increased sensibility is done away with. If the vessels have had time to relieve themselves by effusion of part of their contents, the effused particles are absorbed, and the swelling disappears. In short, when inflammation terminates in resolution, the part is left in the same state in which it was previous to the supervention of the attack. It is not an instantaneous process, but gradual in its completion.

Again, it not unfrequently happens, when inflammation has occurred in the surface, and continued for a short period, that it spontaneously disappears, and does not again return; the action is said to terminate in *Délitescence*, and of course this is always a favourable occurrence. But if the inflammation, after having suddenly disappeared, attacks another part at a distance from that first affected, the change is termed *Metastasis*. If the inflammation leaves an internal viscus, and appears on the surface of the body, the circumstance is favourable; but if it leaves the latter to attack the former, the result is highly dangerous.

*Treatment.*—In the treatment of inflammation, with a view of procuring resolution, our attention must be first directed to the exciting cause; it is, if possible, to be discovered, and removed. Thus, foreign bodies are to be extracted—fractures reduced—strictures divided—unnatural accumulations of fluid withdrawn, &c. In many cases, if the exciting cause is removed, nothing more is required, the in-



flammation speedily subsiding. If the cause cannot be removed, or if, after its removal, the inflammation proceeds unabated, the arterial action must be reduced by general and local abstraction of blood. By general depletion, the action of the whole sanguiferous system is diminished, as well as of those vessels more immediately engaged in the morbid action; but the affected capillaries are still dilated, and less capable than the larger trunks of effective contraction to propel their contents; and are therefore only sufficiently depleted by the local abstraction of blood, by leeches, cupping, punctures, or incisions. Blood may be drawn either from arteries or from veins. In Arteriotomy, the blood is discharged more rapidly, and its flow is of longer continuance, than from a vein, so that the system may thereby be almost completely deprived of its circulating fluid; and perhaps a more speedy impression may be made on the inflammatory action. Perhaps the only objection to venesection is, that after frequent and copious venous hæmorrhage, the internal vessels become gorged with blood, and a disposition to apoplexy is induced. But bleeding is not to be had recourse to without due consideration of the age, strength, constitution, and idiosyncrasy of the patient; if employed, it must be modified according to these; and it has already been mentioned, that depletion is not always to be persevered in on account of the presence of the buffy coat.

Bleeding is materially assisted in reducing the activity of the circulation, by the employment of saline purgatives, along with nauseating doses of antimony.

Diaphoretics are of essential service in promoting the action of the exhalants, and thereby relieving the affected capillaries. The exhibition of opium is frequently advantageous, more especially after depletion, in allaying the painful sensations when severe; and also in procuring refreshing sleep, when the patient is anxious and restless. Digitalis has been administered, with the view of reducing the arterial action; but it has been fully established, that this medicine acts at first as a direct stimulant, and that it is only after its use has been continued for some time, that its effects become sedative.

The local applications to an inflamed part may be hot or cold. The latter will perhaps be at first the more grateful to the sensations of the patient; but warm fomentations are more useful; they relieve the pain more effectually, and at the same time promote the cutaneous transpiration.

During an inflammatory attack, the patient should be allowed very little food, and what he does receive must contain little nutriment in proportion to its bulk. But in many cases it is unnecessary to enjoin such abstinence, as the patient has no appetite, and refuses food.

In inflammation of deeply-seated parts, such as the apparatus of some articulations, it is a frequent mode of assisting the completion of resolution to excite inflammatory action in an external, and consequently less vital and important part. This is accomplished by the application of stimuli, caustics, cautery, setons, &c.

It appears that the stimulating substance produces an incited action of the blood-vessels, or a *revulsion*; according to the older authors, in the part to which it is applied; and that, consequently, the neighbouring arterial trunks, in order to sustain that incited action, supply the part with a larger proportion of their contents than it usually receives; and the necessary consequence of the stimulated part receiving an additional supply of blood, is, that the part originally inflamed receives less. In fact, the effect seems analogous to that of topical bleeding, with this difference—that it is more permanent.

But it must be borne in mind, that this method is not to be resorted to in the commencement, or during the active state, of the inflammatory action, but only when that action has begun to decline, otherwise the disease may be much aggravated, instead of being relieved.

If, notwithstanding all the means employed to procure resolution, the inflammatory action continues unabated, the result next to be desired and accelerated is Suppuration; and with this view, it becomes necessary to change the treatment, both local and general.

### *Of Suppuration as a Consequence of Inflammatory Action.*

In many constitutions, the slightest incited action of the vessels is followed by the formation of pus, and

the appearance of a depôt of purulent matter is often the first indication that such action has existed ; but in the majority of instances, the deposition of pus is preceded by the usual characters of well-marked inflammatory action. Suppuration occasionally occurs without previous solution of continuity ; for pus is frequently contained in the serous and mucous cavities, when no breach of continuity can be discovered, at least we find a fluid not distinguishable from purulent matter ; it *may* be a vitiated secretion, but still it presents the usual characters of pus. But it occurs, generally, when there has been a previous læsion of structure, and in this case its progress is most distinctly marked. In exposed cellular texture, for example, particles of blood are effused ; the serum is afterwards absorbed, and the lymph remains ; this latter gives transmission to minute vessels which deposit the purulent matter, whilst others secrete particles of organised matter to form granulations, in order to repair the loss of substance. This process is often unattended with any great degree of constitutional disturbance. After purulent matter has begun to accumulate under the surface, the pressure thereby occasioned produces condensation of the neighbouring cellular tissue, which, along with the previously effused lymph, forms the parietes of the abscess ; and in proportion as the matter accumulates, the cavity enlarges by the successive processes of ulceration of portions of its parietes, by continued effusion of lymph, and by farther condensation of the surrounding parts.

But in some instances, no lymph is previously effused, and no cyst is formed; in consequence, the matter is not confined, but pervades the cellular substance extensively, and is generally followed by more or less sloughing of the cellular tissue, and by great constitutional disturbance. This most frequently occurs in patients of a debilitated habit, in whom the incited action has been so slight as not to cause the effusion of lymph, by which nature usually sets bounds to the suppurating process.

Pus is heavier than water, of a yellowish-white colour, somewhat of the consistence of cream, and is composed of globules, and a clear transparent fluid coagulable by the muriate of ammonia. It is said to be sweet and "mawkish to the taste."

In unhealthy pus, or in vitiated mucous puriform secretion, the colour and consistence are different, and flakes, resembling portions of lymph are seen floating in it; and by this latter circumstance such fluid is distinguished from the pure or laudable pus. In purulent matter also, especially that of an unhealthy character, the existence of a quantity of sulphurated hydrogen is indicated by the blackening of silver probes, and of various substances applied to the sore.

Suppuration varies much in its symptoms, according to the nature of the parts involved. In general, it is accompanied with the subsidence of acute pain, and fever; but in unyielding textures, the increase of swelling, by the formation of purulent matter, is often attended with an aggravation of the symp-

toms, and with an increase of danger to the structure affected. The pain which accompanies suppuration is dull, and attended with a sensation of fullness and throbbing, and an increase of the tumour; ultimately the parietes of the abscess become absorbed, and the collection, being more superficial, convinces the most careless observer of its existence, by the less equivocal symptoms of fluctuation, pointing, &c. In general, especially when the abscess is deeply seated, a greater or less degree of œdema surrounds it, producing a soft pitting tumour; but not unfrequently, when the degree of excitement is more intense, lymph, instead of serum, is effused, rendering the part more hard and resisting; and in such cases it may be difficult to discover the existence of purulent matter, and the *tactus eruditus*, as it is called, will be found of material service, for though pus is neither acrid nor corroding, still, if allowed to remain, much mischief may be caused—the bones may become diseased—muscles and tendons may slough—and the matter may discharge itself, by means of ulceration, into certain cavities and canals, and produce very serious consequences. Of the bad effects produced by the pressure and irritation of extensive and undisturbed collections of purulent matter, every practitioner must have seen numerous examples. Still, through prejudice, erroneously conceived opinions, or servile imitation, with many the greatest dread seems to exist of the practice of giving a free exit to such depôts.

The symptoms of suppuration are usually prece-

ded by shivering, recurring at intervals, and commonly terminating in profuse perspiration. But this is by no means an unequivocal sign of the occurrence of suppuration.

The older authors supposed that pus was derived from the solids—or that it was formed by the melting of dead animal matter—or that it was the result of putrefaction; in accordance with which latter opinion, the term pus was given to the fluid; but such opinions have long since been justly exploded. Pus is separated from the blood by the secreting power of the blood-vessels of the inflamed part, in consequence of their having assumed a new mode of action. The secretion from exposed surfaces is not at first purulent, but is transparent—does not contain globules—and is somewhat of a gelatinous appearance; and it is only after it has been exposed to the atmosphere for some time that the fluid contains globules, and becomes true purulent matter. But pus is often formed where the secreting surface could not have been exposed to the air; for, on opening an abscess, the parietes of which had been previously entire and not much attenuated, purulent matter of the usual properties is copiously discharged. The formation of the globules also seems to be independent of any vital action; for if the fluid, immediately after its secretion, be removed from the sore, and kept in a similar temperature with that of the inflamed surface, and be at the same time freely exposed to the air, globules will appear in as short a period as when the secretion is allowed to remain in contact

with the sore. Some have supposed that the mere admission of air into the cellular substance causes suppuration ; but this is far from being correct. In chronic purulent depôts, however, the admission of air often produces most serious results, as will be afterwards more fully explained.

Pus was formerly regarded as irritating and corroding, and was therefore carefully removed from every granulating sore ; but purulent matter, though it may prove a source of irritation to the neighbouring parts, does not disturb the surface which secretes it, but, on the contrary, protects the tender granulations, and acts as a temporary cuticle,—the thinner part evaporating, and a crust being thus formed. We frequently see small sores healing rapidly when protected by such a crust ; and we, in some instances, adopt the hint given to us by nature, and produce a scab by the application of powders, lunar caustic, &c. An ingenious theory has been given as to the formation of tubes in the coagulated pus, in consequence of the effusion of carbonic acid, and these tubes being afterwards filled with red blood ; but such theorising, it is presumed, will not stand the test of experience. The discharge does not always consist of laudable purulent matter, but degenerates, in consequence of disturbance of the constitution, or of the part affected. It is also frequently suppressed, in consequence of overaction in the vessels of the part, or from debility, partial or general. Suppression of a purulent discharge is to be regarded as an untoward symptom, fraught with



considerable danger, being generally followed by the most violent constitutional disturbance. Certain cases would seem to warrant the belief, that a species of metastasis occurs; that the matter is absorbed, and again secreted in a part, perhaps, of the utmost importance in the animal economy. In purulent collections, after wounds from accident or operation, on the suspension of the discharge the patient becomes affected with severe constitutional irritation, and gradually sinks; and, on dissection, purulent depôts of considerable size are frequently found in the viscera of the chest or abdomen, which were not indicated by any, unless very equivocal, symptoms, and these appearing very soon before dissolution. A late writer has endeavoured to connect this with inflammation of the veins; but such an opinion is not borne out by observation, although the two circumstances may occasionally co-exist.

From the discharge varying according to the state of the system, the latter can in general be accurately ascertained by examination of the sores which afflict the patient.

In collections of matter not far removed from the surface, the most superficial, and generally the most dependent, portion of the parietes appears inflamed; its inner surface is gradually absorbed; and when it has thus become attenuated, a portion of the integument sloughs or ulcerates. A communication is thus established with the diseased parts, through the external surface, providing an aperture for the evacuation of the matter, of extraneous substances, or

of parts of the body which have either mortified, or otherwise become useless to the system. In such collections, more especially if deeply seated, the matter generally seeks the surface, or extends in the course of the blood-vessels.

As formerly remarked, suppuration occurs much more readily in some constitutions than in others; and patients peculiarly liable to the formation of abscesses, without any great degree of previous excited action of the blood-vessels, are said to labour under STRUMA or SCROPHULA. These terms are by some used to denote a distinct or specific disease, while others consider them merely as a particular state of the constitution.

The strumous diathesis is said to be marked by hair and irides of a very light colour, and by the skin being of a peculiar white hue; but, in some instances, the complexion is unusually dark and sallow. The upper lip is generally of a swollen appearance, as also the columna and alæ of the nose. The organization throughout is delicate, and the patient is frequently of a handsome, though infirm, structure.

Constitutions, in every respect strong and vigorous originally, may from various causes become weak, and present many of the symptoms usually termed scrophulous. I recollect a young patient, who had enjoyed excellent health, and had been born of healthy parents, becoming covered with ulcers and chronic abscesses, in consequence of exposure to cold during menstruation.

The strumous diathesis is said to depend upon a want of balance, or proportion, between the solids and circulating fluids, or among the vessels themselves,—those containing colourless fluid becoming unusually numerous. Want of action and power in the organs forming and circulating the blood, disordered digestion, and various other circumstances which it is unnecessary to detail, have also been considered as causes of this state of the constitution.

Many suppose that the diathesis, or a disposition to the diathesis, is always congenital, and this opinion is supported by the majority of cases. However, certain circumstances produce a scrophulous habit of body in patients who previously appeared to be vigorous and healthy, and untainted with any peculiar disposition to <sup>the</sup> disease. Of these predisposing causes may be mentioned, poor diet, an impure atmosphere, exposure to damp and cold, inattention to cleanliness, the latter circumstance acting sometimes by producing local irritation: in fact, whatever deranges the general health, seems, in many cases, to induce the strumous diathesis. Some constitutions are incapable of resisting any unusual incitement of the vascular system, or of repairing the consequences of the action, or of any injury, in whatever way inflicted. In such individuals, all the parts of the body are deficient in power—some, however, are more so than others, and, consequently, more readily give way; thus, the lymphatic system, the mucous membranes, the skin, the bones and their coverings, generally suffer in the first instance.

Glandular swellings of all kinds, and in all situations, often followed by suppuration, are apt to occur from irritations of various descriptions, but more so in constitutions originally weak, or which have become debilitated by disease or any other cause. The larger glandular tumours are formed by congregation and agglutination of the smaller ones, and by the deposition of adventitious matter in the cellular substance; spontaneous separation of the smaller tumours composing these is a highly favourable symptom, and equally encouraging to the surgeon and the patient.

Dentition, carious teeth, stumps of teeth, excoriations behind the ears, eruptions on the scalp, affections of the lining membranes of the eyelids, mouth, nose, of the skin of the face, are daily found giving rise to glandular swellings in the neck; whilst irritations in the urethra, excoriation or slight disease about the anus, corns or sores about the feet or toes, &c., produce similar affections of the glands in the groin. Such sources of irritation are, of course, to be looked for in the first instance, and will often materially influence the diagnosis, though too much is occasionally attributed to their influence. Such glandular tumours, however, sometimes occur spontaneously, or at least without any evident cause. They have been mistaken for other diseases, according to their situation—for aneurism, hernia, or venereal bubo, &c.; the latter mistake is often unintentionally committed by the ignorant, or designedly by the unprincipled.

Tumours formed by the enlargement of glands are frequently productive of dangerous consequences. If situated in the neck, they may render breathing and deglutition extremely difficult, and in the event of their suppurating, the purulent matter may be discharged into the trachea or gullet; fatal results have followed the giving way of an abscess into the former canal. The breathing is also seriously impeded by enlargement of the bronchial glands, by the pressure of which the lungs may be much condensed, and unfitted for their functions; and if the tumours suppurate, the matter is eventually discharged either into the cavity of the pleura, producing empyema, or into the bronchia, causing, in many instances, speedy suffocation. The immediate effect of enlargement of the mesenteric glands, is interruption to the circulation of the chyle, and a consequent decline of the powers of life. Such tumours in the abdomen have been mistaken for enlargement of the liver, spleen, ovarium, &c., and the most noxious treatment employed.

Glandular enlargements terminate either in resolution, in delitescence, or in suppuration; seldom in death of the part. When the tumour, after having attained a certain size, gradually disappears, it is said to be resolved; when, however, it is rapidly discussed, it terminates in delitescence; the difference between the terms being the same as when used to express the corresponding terminations of an inflammatory swelling.

Suppuration is by far the most usual termination, and the matter is frequently evacuated through nu-

merous small apertures, exposing the gland denuded and prominent in the middle of the chasm; in such cases, the gland proves the source of much irritation, and must be destroyed, otherwise the cure is extremely tedious.

Collections of pus in glands or cellular substance, in patients of a weak constitution, either naturally or in consequence of disease, are attended with little or no pain, or inflammatory action; and although it is probable that inflammation does precede the formation of such purulent depôts, still it is generally so slight as not to be observed by the patient or his attendant. The sensation is dull and uneasy, rather than painful; and, even after the accumulation of a considerable quantity of purulent matter, redness of the surface and pointing do not occur till a late period. The contained matter is thin, flaky, and of a brownish colour. The collections often attain a very great size, and, if improperly treated, terminate in the formation of numerous and extensive sinuses.

The skin, particularly that of the face, becomes, in very many cases, affected either primarily or secondarily with scrophulous ulceration, which commonly extends to the neighbouring textures. The disease has been mistaken for cancer, and other affections of a malignant nature, and has received various names accordingly. The integuments in the neighbourhood of the ulcer are of a purple hue, and become undermined, from the extension of the disease in the subjacent cellular tissue. The discharge is thin and gleetty—the sore is of an unhealthy and debilitated charac-

ter, and makes but little attempt at reparation; its surface is covered by a viscid fluid, and sloughing occasionally occurs in consequence of the extreme debility of the parts. Numerous sinuses frequently extend in a superficial direction, and render the cure more tedious and complicated.

Those of a scrophulous constitution are most liable to be affected with caries, softening, and other diseases of the bones and their coverings; these, however, will afterwards be treated of, along with ulceration of cartilages, diseases of ligaments and synovial membranes, lumbar abscess, &c.; all of which affections, in the plurality of instances, are connected with the strumous diathesis.

In the treatment of abscesses, the principal indications are, to remove any degree of inflammatory action with which the surrounding parts may be affected—to keep the part moist, clean, and at rest—to remove all source of local irritation—and to promote and accelerate the progress of the matter to the surface; for though it sometimes happens that collections of purulent matter are absorbed, still the occurrence is so rare, that to treat an abscess with the expectation of resolution would be highly injudicious. Warm fomentations afford great relief, especially at the commencement, when there still remains a considerable degree of surrounding inflammation. These may be either what are termed anodyne, or not; in general, fomentation with camomile flowers, contained in a woollen bag, and wrung out of warm water, will be found the most convenient and efficient, and

is well entitled to the term anodyne, which is usually applied to others of a complicated, and not more efficacious, character. Poultices are of material service, particularly when the collection has become matured; and their composition is of little importance, provided they are moist, warm, and soft. Their use, however, may be continued too long; for after an abscess has given way, the suppuration may extend in consequence of the continued use of the poultice, which promotes such action; the opening will enlarge, the skin become undermined, loose, and flabby, the abscess will extend, while the process of granulation will be in a great measure suspended. In many cases, the poultice must be discontinued before a natural opening has been formed, for the cure is often much accelerated by the artificial evacuation of the matter. When the abscess is situated deeply, or beneath a fascia, a free and early opening must be made. For example, when suppuration has occurred in the cellular tissue beneath the fascia lata of the thigh, it at first naturally tends towards the surface, but its progress is impeded by the tendinous aponeurosis; a painful feeling of tension is thereby occasioned, and the matter extends where there is the least resistance, making its way in all directions into the surrounding cellular tissue—separating the muscles—isolating the arterial trunks—burrowing beneath the fascia over the whole limb, and producing most serious, and often irreparable mischief, with violent constitutional disturbance. The bad effects of delay are daily witnessed in neglected cases of paronychia; most excru-



ciating pain is produced—the system is seriously affected—the tendons slough, and the member is rendered useless.

By the continued presence of purulent matter, absorption, ulceration, caries, and even death, of bone, is frequently produced, all which would have been prevented by its timeous evacuation. If pus collect in the neighbourhood of cavities or canals, it is of the utmost importance that it be early discharged; and the evil effects of negligent treatment are well exemplified in the following cases:—A patient had been allowed to labour, for a long time, under an extensive abscess at the lower part of the neck, beneath the origins of the sterno-mastoid muscles. The abscess at length gave way externally; but the patient was at the same time seized with profuse expectoration of pus, and during expiration the air escaped through the external openings in the neck. It was evident that the abscess communicated with the trachea, and it also appeared to have extended into the mediastinum. The patient soon perished, but there was no opportunity of examining the parts. In another case of extensive abscess at the root of the neck, an opening was proposed, but delayed. At length the abscess gave way spontaneously, and from the circumstance of portions of solid as well as fluid ingesta escaping by the external opening, it was evident that the esophagus had ulcerated. The cure was very tedious, but ultimately complete.

In suppuration of the cellular substance in the neighbourhood of the anus, the matter may present

itself externally, whilst it is making extensive progress internally; and if a free opening is not made, fistula ani is the result.

The propriety of early evacuation of purulent matter in important, or very sensible, organs, such as the eye and testicle, is self-evident.

The larger arterial and venous trunks appear not to suffer from the suppuration, for in purulent depôts we find them entire, and much thickened by copious effusion of lymph into their outer cellular coat; the nerves, however, are not so much protected by nature, but suffer along with the other tissues.

The most convenient and effectual mode of opening an abscess is with a sharp-pointed bistoury, and the incision will vary in extent according to the circumstances of the case. The straight instrument will be found to answer best in deep-seated collections; in the more superficial it may be slightly curved. The aperture must always be made at the most dependent part, which is also, generally, the thinnest, as thereby a free exit is allowed to the matter. If the incision be not made in a dependent part, a considerable quantity of the matter will be retained within the abscess, and can only be evacuated by squeezing the parts, applying compresses, &c., which produce much irritation and unnecessary inconvenience to the patient.

When the abscess has been deeply seated, and the incision made through a considerable thickness of healthy parts, it is necessary to introduce a small piece of lint between the edges of the wound, other-

wise they will speedily adhere, and the discharge of the matter will be in this way prevented. In consequence of smart hæmorrhage, also, it may be necessary to stuff the wound with lint, and retain it for an hour or two ; but in general, the practice of stuffing abscesses is hurtful. After the incision, it is unnecessary and injurious to discharge the pus forcibly by squeezing the sides of the abscess ; the application of a poultice will promote the evacuation of the matter, and allay the irritation. In chronic abscesses of large size, it is sometimes necessary to make a counter-opening,—that is, an opening in a part of the tumour opposite to the original opening, in order that the matter may be more completely discharged. Setons are highly injurious in phlegmonous abscesses, being productive of much irritation in parts which are already in a morbid state of excitement ; but in chronic collections, which show no disposition to heal, their use will be followed with good effects, on the same principle that they were hurtful in the preceding case ; and if they should not cause a sufficient degree of excitement, they may be smeared with some stimulating unguent. In extensive collections, in which the matter is not sufficiently evacuated by the external aperture, injections are often useful ; in those which are comparatively recent, and in which the surrounding parts are still in a state of over-excitement, the injected fluid must be of a bland nature ; whilst chronic and indolent depôts are to be treated by stimulant or irritating injections, for the same reason that the seton is employed. Caustic,

the potassa fusa, may be frequently employed with advantage for opening chronic abscesses, especially when they are the consequence of glandular enlargement, and undermine the integuments, which show no tendency to adhere to the subjacent parts. The potass is always to be used in the solid form, and not in paste, as is sometimes practised. By its application the unhealthy surface is destroyed, and the surrounding parts are stimulated so as to assume a sufficient degree of action to throw off the portions which have become useless, and to form new and healthy granulations, whilst the surrounding effusion of lymph or serum is for the most part speedily absorbed. But it can never be employed in acute abscesses without aggravating the disease; and in collections which are deeply seated, it cannot be of much service, for in these a considerable thickness of healthy parts must be destroyed, and if the potass be applied, it will afterwards be necessary to cut through the slough, as was practised by the older surgeons, in order to evacuate the matter and give relief to the patient; or else to continue the application of the caustic for an inordinate space of time, which is a practice altogether unnecessary, extremely cruel, and productive of much irritation, constitutional as well as local.

A too common result of abscess, I mean when inertly treated, is the formation of a *Sinus*; that is, a long canal, the circumference of which is condensed and lined with solid lymph, and discharges unhealthy purulent matter, frequently thin and gleety.

This seldom occurs singly; on the contrary, several of them unite, and evacuate their contents by one opening. Previously to treating a sinus, its extent must be carefully examined by the probe; which requires considerable caution, for the full extent of the canal may not be discovered, in consequence of its tortuous course, or from its diverging into collateral branches; or the probe, by being used too forcibly, may pass into parts altogether unconnected with the morbid cavity; thus, in exploring a sinus at the lower part of the leg, or in the foot, the probe may be pushed to a considerable extent beneath the tendinous sheaths of the muscles, and induce the surgeon to adopt treatment unnecessarily severe. Such mistakes have actually occurred; and amputation has been performed at the middle of the leg, whilst a considerable portion of the foot might have been saved. In the treatment, we may at first employ setons, injections, and graduated pressure, as formerly explained; and if these fail, the canal must be freely laid open by the knife,—a mode of practice much more effectual; then there is formed a cavity similar to that of a common abscess, and to be treated accordingly. Incision is most frequently necessary when the sinus exists in adipose substance, in tendinous structure, in parts possessed of little vitality, and in patients of a sluggish and enfeebled constitution. In sinus, as well as in abscess, the potass is of essential service; a stick of it may be introduced into the canal, and if the sinus is superficial, the integuments may be divided by this caustic as effectually

as by the knife. The indolent and callous surface of the sore is thereby destroyed, and the effects are similar to those which have been already mentioned, when speaking of the use of potass in abscess; in fact, by its application the sinus is transformed into an acute abscess. Foreign bodies, such as diseased bones, must be early removed; for it is to be remembered that these are much more frequently the cause than the consequence of suppuration. The healing of an abscess which has been opened, closely resembles the process of union in a flesh wound; granulations arise, attended by the secretion of pus, the cavity gradually contracts, the surrounding effusion is absorbed along with a portion of the adipose matter; and on the granulations reaching the surface, new skin is formed, and the parts cicatrize.

After abscesses have been opened, the fomentations and poultices are to be continued, but only for a limited time. The power of the system must be carefully supported by the admission of pure air; by nourishing food; by the exhibition of wine, tonics, and such medicines as promote digestion. In cases where the system is unusually inert, it may be proper to administer stimulants. The most powerful stimulants are frequently necessary, and by steady perseverance in the use of them, patients have often been saved in very hopeless circumstances. Great attention must be paid to the bowels, for on these the state of the constitution materially depends. The internal use of cantharides is often advantageous in chronic suppurations and abscesses, but it is

inadmissible in cases where enlarged glands occupy dangerous situations, either externally or internally; unless the tumours are in progress towards resolution, suppuration is certainly induced, and may be productive of the worst consequences. The glands not unfrequently become enlarged during the exhibition of this medicine; and such an occurrence must be watched attentively. In illustration of the good effects of stimuli in certain cases, it may be mentioned that the cavities of abscesses are often speedily effaced by granulations, and that obstinate sores frequently contract and cicatrize, after the occurrence of a febrile attack, though they had previously shown no disposition to heal.

In glandular swellings, Deobstruents, as they have been called, are used; and with this view, mercury is often had recourse to; this medicine, however, instead of producing a salutary effect, tends still farther to impair the constitution. Iodine, exhibited both externally and internally, is of great use when the swellings have become stationary, or are inclined to subside. When the tumours are irritable, fomentations may be employed, and advantage taken of sea-bathing, warm or cold.

In the treatment of large indolent collections, it is an occasionally successful practice to make a minute aperture, and afterwards by pressure to evacuate the contents of the abscess as often as the matter accumulates; but a great degree of constitutional irritation frequently supervenes, and the discharge becomes bloody, putrid, and mixed with a considerable quan-

tity of gaseous fluid. The discharge of blood probably arises from the usual support being taken away from the vessels ramifying on the surface of the cavity, in the same way that blood is effused into the cavity of the abdomen, in consequence of the too rapid evacuation of the serum in ascites. Such consequences may be in a great measure prevented by the gradual and continued pressure of a properly applied compress.

Suppuration, more especially when extensive and long continued, is attended with a peculiar species of fever termed **HECTIC**. This fever is the remote consequence of local injury, or disease, whereas symptomatic inflammatory fever is the immediate one. In long-continued disease, particularly internal, the hectic occasionally occurs without suppuration, or before it has commenced; and it does not always supervene upon suppuration, even though extensive. By many it has been supposed to arise from the absorption of pus; and although in not a few cases there may be circumstances which support this theory, still, in some instances, pus appears to be absorbed without the occurrence of hectic fever. Thus, abscesses occasionally disappear, in consequence of speedy absorption of their contents, whilst this event is not followed by any unpleasant symptom; and in large sores, attended with profuse suppuration, there is every reason to believe that pus is absorbed, though no hectic ensue.

Hectic fever is most apt to arise in constitutions originally weak; and usually either from some incurable disease of a vital organ, or from extensive affec-



tion of a part not essential to life ; but it may also be induced without any local assignable cause.

The general symptoms are those of a low and gradual fever, attended with great debility ; the pulse is frequent, unequal, small, and sharp ; the general surface is pale ; there is flushing of the face, hands, and feet ; the skin, at one period, is cold and clammy, sometimes dry and rough—at another, it is bathed in profuse perspiration, especially towards evening ; chills alternate with flushing ; the appetite is much impaired ; diarrhœa supervenes ; pale-coloured urine is voided in great quantity, often with a lateritious sediment ; there is want of sleep, and great anxiety ; the eyes are sunk, and of a glassy hue ; the features become changed ; there is great emaciation ; the patient becomes gradually more and more weakened, falls into a state of coma, and expires.

A condition somewhat resembling sympathetic fever, occasionally supervenes in a constitution that has been suffering from hectic, when any additional irritation occurs, and this fever has been called **IRRITATIVE**. The sanguiferous system becomes more excited—the secretions are suspended—the sensorium is disturbed—but still the symptoms are accompanied with the peculiar debility characterising the state of hectic. It frequently arises from the opening of large chronic abscesses, by making a minute aperture in the way formerly described, and is relieved only by free evacuation of the confined matter.

In the treatment of hectic, the local disease giving rise to the symptoms, if it cannot be cured by other

means, must be removed by operation. Thus, if hectic is consequent on long-continued, but not extensive, disease of bone, the affected portion is to be taken away; if from extensive chronic disease of an arm or leg, the limb must be amputated.

In general, the removal of the hectic cause is followed by immediate melioration of the symptoms, even though the patient had been reduced to an almost moribund condition: the feeble hectic pulse of 120 or 130 sinks in a few hours to 90, and becomes more full and strong; anxiety and restlessness cease, and a patient sleeps soundly the first night after the operation, who for weeks had scarcely closed his eyes; the cold sweats and colliquative diarrhœa immediately subside, and the urine loses its sediment; in effect, all the hectic symptoms disappear, and are succeeded by such as indicate a marked improvement in the power and energy of the constitution, and the rapidity with which these changes take place, is in many cases truly astonishing. Nourishing food, wine, tonics, &c. must be given, in the first instance sparingly, and afterwards gradually increased in quantity, according as the stomach can bear them; for it is not to be overlooked, that their incautious and too liberal use may be productive of irretrievable evils, as the action of the system will be thereby increased beyond its resources, in the same way as the imprudent application of stimulants to a part debilitated by an excessive degree of cold, causes its sphacelation, in consequence of the arterial action induced being greater than what the power of the

part can support. The mineral acids may be useful in checking the inordinate perspiration; opium, astringents, absorbents, &c. in arresting the diarrhœa; but all are of little avail unless the exciting cause is removed, and to this latter circumstance the attention of the practitioner ought therefore to be chiefly directed.

*Mortification, or the death of a part*, is also one of the results of inflammatory action, and the term has been subdivided into GANGRENE and SPHACELUS. Gangrene is that state in which the larger arterial and nervous trunks still continue to perform their functions; a portion of the natural temperature remains, and the part may be supposed still capable of recovery. Sphacelus, again, expresses complete death, when, putrefaction being no longer resisted, the part becomes black, cold, insensible, and fœtid; but, in general, the distinction between the terms is not strictly attended to. A division of more importance is into humid and dry, or traumatic and chronic, gangrene; humid or traumatic being applied to mortification produced by external injury; dry or chronic to that resulting from a constitutional cause. Mortification is sometimes preceded by incited action of the vessels, sometimes not.

Humid or traumatic gangrene frequently occurs without previous inflammation, the injury being so severe as at once to deprive the part of its vitality. Dry or chronic gangrene is often unpreceded by inflammatory action.

The most common cause of spontaneous mortification is a rigid state of the arteries, most frequently met with in the inferior extremities of elderly persons, in consequence of the deposition of calcareous matter between the internal and middle coat; this calcareous degeneration may be confined to a part of the limb, or may pervade the whole of it, and even extend throughout the arterial system. There are many cases in which disease of the arteries has existed, though no gangrene occurred; but this by no means invalidates our assertion, since, when arteries are thus affected, the part cannot withstand sphacelus when exposed to any of its immediate causes. After wet seasons, spontaneous gangrene has prevailed as an endemial disease on the continent, where rye is a principal article of food. The rye is subject to a disease called *Ergot*, or *Cockspur Rye*; the grains become large, black, and have a horny consistence; and the use of it, when thus diseased, is assigned as the cause of gangrene. The patients who have suffered from it have experienced pain and heat, with swelling, generally in the lower limbs, though occasionally in the upper. These symptoms abating, the parts became cold, insensible, and discoloured, and were gradually separated from the body. The disease attacked patients of both sexes and every age, did not appear to be infectious, and was frequently fatal. It has occurred in this country from the use of unsound wheat. A tendency to mortification sometimes arises from a peculiar state of the atmosphere, want of cleanliness, poor and irregular diet, &c. Can-

Probably the

crum oris, for example, and sloughing of the pudendum in children, occur in those of the poorer classes who live in low, damp, and dirty situations ; and no incited action precedes the sloughing.

Mortification, to a greater or less extent, may be produced in any constitution, and at any age, by the application of heated substances, caustics, acids, &c. ; by the effusion of acrid matter into the cellular substances, as urine or fœces ; by the interruption of the circulation and nervous energy, as from ligatures or improperly applied bandages—or by natural strictures, as those in hernia and paraphymosis ; by long-continued pressure ; and by violent contusions, as in fractures, compound luxations, and gunshot injuries. A frequent source of mortification, in inclement seasons and climates, is exposure to extreme cold. In this case, the cold is not the direct, but the indirect cause ; the power of the parts is very much weakened by exposure to the low temperature, and is thereby rendered incapable of resisting the incited action which follows the stimulus of sudden transition from cold to heat, even though the degree of increase in temperature should not exceed that of the natural standard. That cold is not the direct cause of mortification, has been undeniably proved by facts derived from military practice. No symptoms of inflammation or gangrene occur when the soldier is on duty, and continuously exposed to severe cold ; but they speedily present themselves after a rapid thaw has commenced, or after the soldier has imprudently approached a fire. Soon after the half-frozen patient

has begun to feel a little more comfortable from sudden warmth, he becomes aware of pain, attended with a sensation of itching in the extremities, generally the lower, which are considerably swollen, and of a dull red colour; these, and other symptoms of inflammation, are of no long duration, the action speedily runs its course, and the part soon plainly indicates that gangrene has commenced.

When gangrene follows the tight application of a ligature, the death of the part seems to depend more on obstruction to the circulation of the blood, than on any diminution of the nervous energy, for we do not observe that paralytic limbs are peculiarly liable to gangrene. The surgeon frequently takes advantage of the fact, that a part soon dies when its supply of blood is cut off, or its return in the veins interrupted; and has recourse to ligature for removal of parts, when he considers it inexpedient to employ cutting instruments.

Mortification may be produced by the above mentioned causes, either immediately or consecutively; and it will occur in some constitutions, or states of constitution, at some periods of life, in some structures, and in some parts of the body, more readily than in others.

Inflammatory action is seldom so intense as to terminate in death of the part, unless the power of that part has been diminished by previous local or constitutional disease, or by injury; and the inflammation preceding gangrene is all along attended by symptoms of so well-marked debility, both local and general,

that it is frequently designated the *Inflammatiō Debilis*. Of inflammatory affections, the erysipelatous most frequently terminates in gangrene; in other words, the power of resisting incited action is not so great in the skin as in other parts of the body.

The period at which the symptoms of gangrene appear after an accident, varies, in general, according to the severity of the injury. As was already observed, the part may be immediately deprived of its vitality—if not, symptoms of gangrene sometimes appear within a few hours after reaction has taken place; while in other cases, tension, pain, and heat occur, and may continue for a longer or shorter time, according to the degree of power remaining in the part. Tension often exists to a great extent after severe injuries, from extravasation of blood or serum; the functions of the vessels are thereby interrupted, and gangrene is inevitable. As the action proceeds, the pain and heat often subside—the parts become flaccid—dark-coloured serum is effused beneath the cuticle, forming what are termed *Phlyctenæ*—the skin becomes dull and livid—dark streaks extend along the limbs—air is effused into the subcutaneous cellular tissue, causing a sense of crepitation when pressed by the finger—sloughs form, either black or of an ash colour—and the gangrene involves a greater or less extent of the limb. In some instances, the mortification is most towards the surface; in others, it is chiefly amongst the deeply seated parts. Sudden cessation of pain is generally regarded as an unequivocal sign of the occurrence of gangrene, especially

in the internal viscera ; but it not unfrequently happens, that the painful sensations suddenly cease, whilst no gangrene supervenes, and that a part mortifies, whilst the pain continues but little abated.

In compound fractures, or dislocations, dark-coloured prominent points occasionally appear, in consequence of the effusion of bloody serum beneath the cuticle ; in these, however, the fluid is speedily absorbed, and the surface resumes its natural aspect ; and it is of consequence to know their real nature, for if mistaken for the gangrenous phlyctenæ, the inexperienced practitioner may be alarmed, and, consequently, have recourse to very injudicious practice.

When the process of gangrene is checked, the skin immediately beyond the mortified part becomes of a brighter hue, and is affected by a more healthy species of inflammation, which ultimately terminates in suppuration, and thereby forms what is called the line of demarcation between the dead and living parts ; the suppurating process, commencing in the integuments, gradually extends to the deeply seated parts, so that the mortified portion is ultimately attached to the living merely through the medium of bone or ligament. Arteries appear more than any other texture to resist sloughing ; and those leading to a mortified part are found contracted and filled with coagulated blood, so that the spontaneous separation of the sloughs, and even incisions for their removal, made in sound parts, are followed by little or no bleeding. This salutary change in the arteries may be accounted for by supposing, that the



inflammatory action which separates the dead substance from the living, affects the arteries at that point as well as the other structures, causing adhesion of their internal surface, and obliteration of their cavities; and the natural result is, that the calibre of the artery above the obliterated point gradually diminishes in size, and the blood coagulates up to the nearest collateral branch: but in consequence of extension of the inflammatory action, the collateral branches may also be obliterated to a considerable extent upwards, and thus the contraction and coagulation in the larger trunk will also extend in proportion. Besides, before the line of separation has commenced, arteries cannot transmit their contents into the sphacelated part, any more than into an extraneous body; so that the circulation of the blood in them is as effectually obstructed as if a ligature were tightly applied; in this way also, the contraction and coagulation may be accounted for.

In humid gangrene, swelling with erethismus generally precedes the death of the parts; whereas in the dry, whether with change of colour or not, they shrink immediately. In the former, they quickly lose their vitality, and consequently retain a considerable portion of their fluids; in the latter, the process is much slower, and they become dry and shrivelled.

Mortification is accompanied with great anxiety; coldness and clamminess of the face and extremities; weak, irregular, and hurried circulation; quick, short breathing; a cadaverous expression of countenance; hiccough, which, however, often occurs in very slight

sloughing, or when no sloughing has taken place, in external or internal inflammations, extravasations, &c. ; by diarrhœa, vomiting, and in hopeless cases, more especially of traumatic gangrene, by delirium and coma ; in fact, almost all the symptoms of severe constitutional irritation are more or less fully developed. In some cases, the patients are restless and unmanageable ; in others, low and dejected. The disease often proceeds with fearful rapidity to a fatal termination, the patient becoming comatose from effusion within the cranium ; but in other instances, in which the vigour of the constitution is greater, and the extent of mischief less, the system bears up under the affection, and a separation is effected between the dead and living parts. The danger is in general to be estimated by a consideration of the size and importance of the part, and of the age and constitution. The destructive consequences of sphacelus arise both from a local and general cause, for the mere application of putrid animal substance to a part still alive, causes inflammation, attended with symptoms of diminished power, and followed by constitutional disturbance ; whilst the ultimate extinction of life may be imputed to the effect produced on the system by the part previously to its becoming sphacelated, and to the sympathy between the system and the parts which are left in a weak and moribund condition, and which seem endowed with a disposition to propagate the disease.

In the TREATMENT of mortification, no one would think of using any means, local or general, so long

as the cause remained, and it therefore must in the first place be removed, otherwise the mischief may speedily become irreparable; thus, a stricture must be divided, irritating fluids evacuated, foreign bodies extracted, &c.

In *chronic* gangrene, the cause is constitutional, and the means employed must be directed accordingly. In general, the power of the constitution requires support, though, in cases where much fever is present, it may often be necessary to keep the patient on low diet. The effects of food should be attentively watched, and its quantity increased or diminished accordingly. On the subsidence of the fever, and when gangrene has occurred, wine and animal food must be given abundantly. Stimulants, strictly so called, are not admissible until the line of separation be formed, and their exhibition must then be regulated by the circumstances of the case. Opium and other anodynes are found necessary during the progress of the disease, to allay irritation and produce sleep; opium has been particularly recommended in mortification of the lower limbs. The bowels must be attended to. Peruvian bark was at one time supposed to be a specific in this disease, but experience has not borne out the hypothesis; it seldom agrees in substance, and sulphate of quinine will be found much more useful in supporting the power and tone of the digestive organs. After the line of separation has been formed, and not till then, the surgeon may interfere, and assist nature in her work, dividing the exposed bones or ligaments.

by which the dead parts still adhere to the living ; or he may perform amputation immediately below the line of demarcation. Amputation in the sound parts cannot be recommended : for vitality is impaired throughout the system, and more particularly near and above the line of demarcation, where, though the structure seems entire, yet the incisions are made in parts really diseased, and which will speedily mortify. In fact, amputation, in whatever way performed, is almost always productive of no advantage in spontaneous gangrene.

In order to prevent the occurrence of gangrene after exposure to intense cold, the frigid part must be cautiously and slowly restored to its natural temperature ; first, by being either placed in very cold water, or rubbed with snow ; afterwards by the degree of warmth in the applications, and surrounding atmosphere, being gradually increased.

In *acute* gangrene, and in robust constitutions, when the affection arises from overaction, abstraction of blood is had recourse to with marked advantage. In some cases it may be employed, but with due caution, even after sphacelus has occurred. In gangrene, purging, bleeding, and starving must not be had recourse to but with the greatest circumspection ; for it ought always to be remembered, that however strongly they may be indicated, the time is not far distant when they will be totally inadmissible, and when the weakening effects of depletion will prove highly prejudicial, particularly in cases where the mischief is proceeding rapidly.

The loss of blood is frequently beneficial in sloughing phagedena, as is exemplified by spontaneous hæmorrhage occurring in such cases.

When a portion of a limb, throughout the greater part of its substance, is so injured that it evidently cannot recover, it ought to be removed instantly, and before the constitution has suffered.

When gangrene follows inflammatory action, that is first to be moderated, and then the strength by all possible means supported.

When only a portion of the soft parts of a limb is destroyed by mortification, and it is likely that the member may be saved, and prove useful to the patient, measures should be adopted to hasten separation of the dead parts, and reparation of the breach in the living.

After separation has commenced, the attention of the surgeon is chiefly to be directed towards the constitution; it must be supported and strengthened by nourishing food, wine, and tonics, or by stimulants, if necessary. Bark, in substance, acids, and other supposed antiseptics, are of but little use.

The local applications which have been employed are numerous; poultices of all kinds, charcoal, carrot effervescing; various lotions to the surrounding parts; spiritous applications, such as several of the tinctures, liniment of turpentine, balsams, resins, &c., with the view of correcting the fœtor. But it is evident that the majority of such applications to a dead part can be productive of little effect; and the only beneficial result that can be expected from such means, is removal of

the fœtid smell, which will be best accomplished by sprinkling a solution of the chlorate of lime on the body-linens and bed-clothes. Scarifications are sometimes used; when these are made merely into the sphacelated part, they can be productive of good only by allowing the escape of matter; when they extend deeply, they are injurious. This practice, however, as will be noticed, is adopted with the best effects when mortification is threatened.

When the sloughs become loose, they must be removed; and when the sphacelated part has separated entirely, the healing of the breach must be promoted by judicious dressing and bandaging.

In mortification of an extremity, in consequence of injury, removal of the part by incision in the sound substance, was formerly as much dreaded as in chronic cases before the separation had commenced; but such fears have now subsided, and the practice of delay has been in a great measure relinquished,—amputation being performed in the sound part, and during the progress of the disease. For if the surgeon defer the operation until a line of separation have begun to form, he will soon discover the danger of his delay; as the constitution will, in the majority of cases, rapidly sink under the malady, without being able even to check the progress of the disease, and throw off the mortified parts.

In gangrene occurring after exposure to cold, amputation should not be had recourse to till after the line of separation has formed; and in this case the constitutional symptoms are much less urgent, and

the object of the operation may be frustrated by its being performed in parts which will speedily become sphacelated.

In gangrene arising from obstruction or injury of blood-vessels, in healthy constitutions, amputation must be performed early—for then the chance of ultimate success is increased, while the danger of delay is the same as in cases of gangrene caused by severe injury.

### *Of Erysipelas.*

ERYSIPELAS is an inflammation of the external surface, accompanied with peculiar symptoms and appearances, in consequence of the morbid action being modified by the particular texture in which it occurs. According to the various circumstances attending the disease, it has been divided into several species: phlegmonous, bilious, local, œdematous, gangrenous, acute, malignant, &c.; but the division into phlegmonous and bilious is the one most generally adopted, and will be found sufficient for all good purposes. The term *Erythema* is applied to cases of rash or efflorescence, unaccompanied with fever, swelling, or vesication.

Inflammation of the skin only is marked by bright redness, not circumscribed, and disappearing when pressed. By pressure, the blood-vessels are emptied for a time, the part sinks and becomes pale; but, on removing the pressure, it soon regains its former

colour and relative situation ; when these circumstances concur, the part is said to *pit*. There is no tension,—the pain is not throbbing, but of a burning or itching kind, and there is often a degree of œdematous swelling. Swelling does not occur to any great extent, however, during the existence of the inflammation in the skin and rete mucosum ; but the parts sometimes become much swollen after subsidence of the inflammatory action, the vessels having relieved themselves by effusion of serum ; and afterwards the œdematous surface often assumes a yellowish hue. In some cases, the serous effusion is more extensive than in others, and hence the term *œdematous* erysipelas. Upon the decline of inflammation, a serous fluid is often effused also in great quantity under the cuticle, giving rise to vesications, resembling the blisters produced by the application of boiling water to the skin ; and from this circumstance, erysipelas has been classed amongst the other cutaneous affections in the order bullæ. The erysipelalous redness does not terminate abruptly, and is not defined by a distinct boundary, as some have asserted, but becomes gradually lost in the surrounding parts. It frequently involves the contiguous parts one after another, and extends with great rapidity. It often leaves one part suddenly, and attacks another, either in the neighbourhood, or situated at a considerable distance ; in other words, metastasis takes place. The disease takes on this erratic character without our being able to assign any good reason for it. When it disappears suddenly, or is repelled by cold applications, affections of the internal organs



sometimes supervene, as of the bowels, lungs, or brain; the diseased action leaving the external surface, and attacking the deeply-seated organs; thus, in a case of erysipelas of the ankle and foot, the external symptoms disappeared suddenly, and an affection of the lungs supervened, under which the patient sunk; and in erysipelas of the head, the sudden disappearance of the redness is frequently followed by delirium and coma. Again, in acute disease of an internal part, the symptoms are much meliorated, and often entirely removed, by inflammation of the skin being induced artificially, or occurring spontaneously. The integuments of the face and head are frequently attacked by erysipelas, in consequence of wounds and bruises of the face or scalp, even though very slight, and it often takes place spontaneously, as in other parts of the body. Erysipelas commonly arises from constitutional derangement, as is shown by the symptoms which precede it, and also by the efficacy of internal remedies in checking its progress; in such instances, external applications, unaccompanied with constitutional treatment, produce little or no effect. It is often produced around a wound by the employment of improper dressing or rancid ointments, by a too free use of the part, or by the friction and irritation of the patient's clothes. It occurs most readily in those who live freely, indulging in the imprudent use of spirituous liquors, and whose constitutional powers are thereby considerably weakened. It is also sometimes caused by violent passions, as anger or grief; and by exposure to cold, or to heat,

—the former acting only as a remote, the latter as an immediate, cause. As an example of its occurring in consequence of heat, it is a trite remark, that cooks, who are necessarily much exposed to the fire, are frequently the subjects of erysipelas of the face ; but in the majority of such cases, there may be another cause in operation,—the abuse of ardent spirits. It is more commonly met with in summer than in winter. And in certain states of the atmosphere, even in healthy situations, a degree of erysipelas is apt to occur after wounds by operation or accident.

It is often periodical, especially in females who have ceased to menstruate, always recurring at regular intervals ; it attacks parts of the body, most generally the face, in some cases monthly, in some once in the year, and in others once every two years. Those who have once been afflicted with the disease, become more liable to its attacks.

Erysipelas is generally preceded and accompanied with more or less disturbance of the digestive organs.

In *Bilious* Erysipelas, the portion of skin affected is of a more yellow colour than in the phlegmonous, the derangement of the digestive organs is greater, and hence the origin of the distinctive term ; fits of shivering occur, the patient complains of a bitter taste in his mouth, and the tongue is furred and of a brown colour.

In the *Phlegmonous*, in which other textures than the skin are often affected, viz. the subcutaneous and intermuscular cellular tissue, and the fasciæ, the pain is more intense, and of a throbbing kind ; the swelling

is hard, more deeply seated, and more extensive; there is considerable tension; and the redness is of a darker hue. Nausea and a bitter taste in the mouth do not precede the erysipelatous appearance, but the skin and tongue are dry, and there is great thirst. When the disease begins to subside, then the foul tongue supervenes, with the bitter taste and nausea.

Erysipelas, of a contagious and violent character, frequently occurs, and is apt to spread extensively, in badly aired situations, where a number of patients with sores are crowded together, without due attention being paid to cleanliness and proper dressing.

*Hospital Erysipelas*, as this species is termed, is nearly allied to that dreadful disease, Hospital Gangrene, and the two affections are often blended. It comes on after operations, or in patients who have sustained an external injury by accident. In unhealthy hospitals it not unfrequently appears in previously sound parts, and without any assignable cause; and, from its following the slightest wound, we cannot safely have recourse to even venesection, cupping, or leeching. It is a dreadful scourge in many hospitals, more especially during particular seasons of the year—during hot, damp weather, and in spring and autumn, attacking the patients indiscriminately.

Of late years, the disease has appeared in the Royal Infirmary of this city during the wet and changeable summers which have prevailed; some of the cases have been very severe, and a few have terminated fatally. It was very satisfactory, however, to observe that it did not spread, that patients occupying the beds imme-

diately around those affected, though afflicted with sores and in indifferent health, remained exempt from the disease ; and that many of the most severe cases did not originate in the house, but were brought from the crowded unhealthy parts of the city.

Hospital Erysipelas is for the most part preceded by violent constitutional symptoms, derangement of the chylopoietic viscera, shivering, brown tongue, and a bitter taste in the mouth ; if there is a sore on the body, it assumes a sloughy aspect ; the surrounding skin becomes of a dark red colour, and there is a feeling of tension, accompanied with a burning pain. The erysipelas extends rapidly, and generally terminates in suppuration and sloughing of the cellular substance, or, if inertly treated, in immediate gangrene of the parts. The concomitant fever is generally low, and though, in the first instance, the circulation may be vigorous, symptoms of debility speedily appear. It will be more fully dwelt upon, along with Hospital Gangrene.

In all cases of erysipelas there is more or less concomitant fever, modified by the extent of the local affection—by the age of the patient—by the previous habits and state of health—by the constitution—and by other circumstances. The pulse is accelerated, and is either of a sthenic or asthenic character, according to the state of the system. There is headach, languor, thirst, restlessness, and even delirium, especially when the face or scalp is the seat of the disease.

Erysipelas may terminate in *resolution*. If this arrests the first stage of the disease, the redness gra-

dually declines, along with the swelling, and the part regains its usual appearance, the skin remaining loose and shrivelled. If it occurs after vesications have formed, the effused fluid is absorbed, a scab forms, and desquamates along with portions of the cuticle.

It may terminate in *suppuration*, when the inflammation has extended to the cellular substance. This termination is most frequent when the disease is situated in an extremity, seldom when in the face, though small purulent collections occasionally form under the eyes. Circumscribed collections of pus seldom, if ever, follow erysipelatous inflammation; but the purulent matter is diffused through the cellular tissue, and is of a thin, unhealthy appearance, and mixed with sloughs of the cellular substance. By the infiltration of matter, the integuments, fasciæ, and muscles, are extensively separated from each other, in consequence of which the parts frequently die, their nutritive supply being cut off.

Acrid sanious matter is often infiltrated extensively into the subcutaneous cellular tissue round a wound or sore. The superimposed integuments are of a dark brown colour, and the part is boggy. Sloughing of the cellular membrane takes place in consequence of the infiltration, and not from inflammatory action having been there established. The affection has been termed Diffuse Cellular Inflammation, but a more proper appellation is Diffuse Cellular *Infiltration*.

Erysipelas, if properly treated, will seldom terminate in *gangrene*. This termination is occasionally

observed, however, in patients whose constitutions have been extremely debilitated.

In mild cases of erysipelas, attention to the state of the bowels, and regulation of diet, will often be sufficient to remove the disease. When there is much disorder of the digestive organs, and particularly of the biliary secretions, emetics may be given at the commencement; these are productive of but little good in the more advanced stage, and their place is advantageously supplied by nauseating doses of antimony, combined or not with purgatives. Such medicines tend to subdue any arterial excitement that may exist, evacuate the bowels, promote perspiration, remove the superabundant bilious matter, and serve to restore the healthy functions of the liver. In severe cases, more especially of phlegmonous erysipelas, in which there is acceleration of the pulse, and a degree of febrile excitement, general bleeding may be had recourse to; but it must be employed with caution, for the symptoms of increased vascular action may arise from constitutional irritation, and not be meliorated by the depletion. In very many cases, the strength is from the first to be supported by all possible means, by nourishing diet, by the exhibition of wine, quinine, and other tonics; more particularly in old people—in constitutions debilitated by disease—in unhealthy situations, and when the fever is of the typhoid kind. Bleeding by leeches is not admissible, for the leech-bites prove a source of irritation, and are liable to suppurate; erysipelas has often been produced by leeching.

In erythema, the skin only being affected, advantage sometimes results from the application of nitrate of silver. The pain and uneasy sensations in the part being thereby diminished or removed, and extension of the disease seeming to be arrested. Discoloration caused by such practice is of little consequence, as desquamation must follow. It is questionable how far it may be safe to apply lunar caustic to an extensively inflamed surface of the head and face, lest metastasis should occur. The inflammatory action in the skin is subdued by the application, whilst it may advance, in the cellular tissue, to suppuration and sloughing, if other means are not adopted; and from the hard and blackened state of the cuticle, the condition of the subjacent parts is not readily perceived. The remedy is only applicable to erythema.

The practice which has proved to be, I may almost say universally, successful, is to use either the lancet or the knife. In cases not very severe or extensive, the constitutional treatment already mentioned is first to be employed, and then the affected part must be freely punctured;—the serous effusion, if any, is thereby evacuated—the overdilated vessels are relieved of a considerable portion of their contents—and the œdematous swelling, with the formation of phlyctenæ, is prevented. The part is afterwards to be fomented for half an hour, or an hour, with bags full of camomile flowers; the fomentation, repeated at intervals, proves highly grateful to the feelings of the patient, allays any irritation which the making of the punctures may have produced, and keeps the

skin perspirable. Under this treatment, every vestige of erysipelas will generally disappear in the course of two days. In more severe cases, especially in the extremities, the parts must be freely incised. The incisions ought to extend through the integuments and cellular substance, and their length and number must be proportioned to the extent and severity of the affection.

Some have disapproved of long incisions, alleging that they are tedious in healing, and prefer making numerous small ones; but it is difficult to understand how the cure should be more tedious in the one case than in the other, when the actual extent of divided surface is the same. According to my experience, several free incisions heal as soon as numerous small ones, whilst by the former the purpose of the practitioner is much better fulfilled; the same good effects result from them as from punctures in the more slight cases, if they are made at the commencement of the disease; and if the affection is in its advanced stage, the effused fluid, and the sloughs, are discharged, and the infiltration of pus, and destruction of parts in consequence of the matter being confined, are prevented by its being allowed a free exit as soon as it is formed. Incisions then are made both in the early stage of the disease, and after effusion has occurred: in the former case, they are justifiable, because they arrest its progress; in the latter, they are absolutely necessary, to prevent its injurious effects. The parts are to be fomented, and afterwards covered with a common poultice, containing no oil or grease.



When the erysipelas has gone off, the incisions are treated as common wounds, by dressing and bandage. After punctures, or incisions, more or less blood is allowed to flow, according to circumstances. In erysipelas of the face, punctures are preferable to incisions, as by the employment of the former the countenance is no way disfigured; if, however, in erysipelas of the scalp, the integuments become swollen, and present a puffy feeling, whilst at the same time cerebral symptoms supervene, free incision or incisions, through the whole thickness of the integuments, must be made. If erysipelas be thus actively treated, I think I may safely affirm that it will not often, unless accompanied with symptoms of putrid fever, terminate fatally; if these means are employed early, the constitutional disturbance will be modified or prevented, and no derangement of the cerebral functions will ensue.

Powders, such as flour, chalk, camphor, have been applied to the erysipelalous surface, but are of little use, and, by their irritation, frequently prove injurious on the bursting of the vesicles. They are applied, according to some, with the view of cooling the surface; and after all the part is enveloped in folds of flannel.

Cold applications, such as the spirituous and evaporating lotions, vinegar and spir. aq. acet. ammoniæ, may, in many cases, afford temporary relief, but their use is fraught with the utmost danger; for their direct action is to produce Metastasis, and if that be to an internal organ of importance, the result is too generally fatal. And if the erysipelas, on leaving the part originally affected, attack another also superficial, the

treatment must be commenced anew ; and if the applications be again employed, the practitioner may very soon come to resemble a wearied traveller following an *ignis fatuus*, exerting himself in no inconsiderable degree, whilst he makes no progress towards the attainment of the object which he has in view. If these lotions are to be employed, they must be tepid. In the translation of erysipelas to any important part, blisters, and even the actual cautery, may be applied to the surface that it has left, or to any other in the neighbourhood, with the view of recalling the disease to its original and less dangerous situation. In the great majority of cases, however, such means are unavailing.

In Hospital Erysipelas, evacuation cannot be carried to any great extent with safety, and general bleeding is seldom if ever admissible, unless in patients previously robust and in good health, in whom the disease has occurred in consequence of their being conveyed to a distance and during hot weather, after an accident or wound, and in whom the fever is of a violent inflammatory nature. In civil hospitals, the patients are generally in a weak state before the accession of this disease ; and in their case, stimulants are more requisite. Great attention must be paid to cleanliness, the sores must be frequently dressed, and the same sponges must not be used for different individuals ; in order to prevent contamination by the promiscuous use of sponges, it is better to clean the sore with lint or tow, and to destroy immediately such dressings as have been used. The

apartments must be well ventilated, and those who are affected with the disease should be separated from the rest of the patients. The local applications will vary according to the particular circumstances of each case.

### *Of Furunculus and Anthrax.*

FURUNCULI, or Boils, most generally occur in unhealthy constitutions, particularly in those individuals who are habitually addicted to the use of ardent liquors: they seem to arise from, at least they follow, disorder of the digestive organs. Their seat is in the skin and subjacent cellular tissue.

They generally occur in those parts which are possessed of little vitality, as in the back, buttocks, shoulders, posterior part of the neck, &c. They are seldom single, are often numerous, and vary in size from a pea to a pigeon's egg.

A boil is of a conical form, elevated above the surface of the body; its base is hard and firm, whilst its apex is acute, soft, of a white colour, and exceedingly painful. The pain experienced in the tumour is severe and burning, and hence the name of furunculus has been given to it. From the comparatively trifling nature of the affection, the assistance of the surgeon is seldom required, and hence the apex of the tumour generally gives way either spontaneously, or in consequence of being scratched by the patient, or rubbed by the clothes: the purulent matter, which is generally small in quantity, and mixed with blood, is

thus discharged. This, however, is attended with but little relief; for at the lower part of the cone is situated a considerable quantity of mortified cellular tissue, which must be evacuated before the cavity can heal.

In this unhealthy species of inflammation, resolution cannot be expected; on the contrary, suppuration is the natural termination of the disease, and must be hastened by poultices and fomentations. A crucial opening must afterwards be made in the apex of the tumour, and the sloughs of the cellular tissue forcibly expressed. In the advanced stage, the sloughs are the irritating cause by which the inflammatory action is prolonged, and on their removal the cavity contracts speedily.

If there is much derangement of the digestive organs, it may frequently be found necessary to administer an emetic. If the bowels are slow, antimony and calomel are highly useful, in combination with active purgatives; if the action of the bowels is more natural, these medicines may be administered in alterative doses. The treatment may be varied by exhibition of Plummer's pill, along with sulphate of magnesia. Anodynes are occasionally required.

*Anthrax* or *Carbuncle* may be considered as the worst degree of boil. It is most frequently met with in the plague, of which it is a characteristic symptom. It occurs in the same parts, and apparently from the same causes, as the boil. The tumour is of a more flattened form, slightly elevated above the surface, and frequently of great extent; the base is deeply-seated,

hard, and unyielding. The integuments are at first of a bright colour, but afterwards assume a dark-red or reddish-brown hue. The pain is violent and burning. The process of suppuration is very tedious, and the matter that is formed is small in quantity. If the tumour is not interfered with, ulceration occurs in its surface, producing various apertures, through which the matter is evacuated. The discharge is thin and unhealthy, excoriating the neighbouring surface; and the mortified cellular tissue, remaining at the base of the swelling, keeps up the irritation. The extent of a carbuncle is frequently great, both as to width and depth; on the back, or buttocks, it not unfrequently attains an immense size: In one instance, the whole posterior part of the neck was involved; the cellular tissue, muscles, and tendons, sloughed; and the vertebræ were ultimately exposed. In another case, the whole occiput, the posterior and lateral parts of the neck, and the space betwixt the shoulders, exhibited one continuous mass of carbuncle. By the making of free incisions, the procuring of early separation of the sloughing parts, and supporting of the strength of the constitution, the patients recovered, though both considerably advanced in life.

The affection is attended with typhoid symptoms, rigors, profuse perspiration, nausea, vomiting, disordered bowels, loss of appetite, anxiety, restlessness, difficult respiration, palpitations, faintings, pale white tongue, low pulse, pale or turbid urine, headach, giddiness, drowsiness, and, in severe cases, with deli-

rium. In old or exhausted patients, the prognosis is unfavourable.

It seldom occurs in the face or head, and when it does, it generally proves fatal. In a male aged forty-eight, a carbuncle of the size of a very large orange was situated in the centre of the forehead; by active local and constitutional treatment, he soon got well.

An early and free incision must be made into the tumour; if the swelling is large or extensive, the preferable form of incision is the crucial; the ill-formed matter is thus evacuated, and the slough exposed, and more readily allowed to escape. If the mortification of the cellular tissue be extensive, and the sloughs prove firmly adherent, the free employment of the caustic potass will be found of much service, the half-dead cellular substance being thereby completely destroyed, and the surrounding parts stimulated to a new and superior degree of action, necessary for the removal of the mortified parts, and reparation of the breach of surface. Poultices and fomentations are afterwards to be employed. The stomach and bowels must be put into proper order by the exhibition of suitable medicines; and the *vis vitæ* may be still farther supported by the administration of stimulants. If, after the separation of the sloughs, the exposed surface shall assume an indolent or debilitated action, stimulating dressings are to be employed.

Such practice will be found sufficient to procure a speedy and favourable termination of the disease, in this country, where we have not to combat any of

those malignant diseases with which carbuncle is accompanied in other climates.

### *Of Inflammation of the Mucous Membranes.*

MUCOUS Membranes and the skin are analogous in structure, somewhat similar in function, and sympathize closely with each other, in health and in disease. Both are endowed with that particular degree of sensibility which enables them to bear with impunity the impressions of foreign bodies ; and both are protected from the influence of these bodies by an inorganic covering ; the cutis and rete mucosum by the epidermis ; the chorion of mucous membranes by a cuticular lining, by a mucous fluid, or by both. They are the seat of all excretions, and by them all substances are introduced from without into the system. The capillary portion of the vascular system appears to have the same arrangement in both. At the commencement and extremity of the alimentary canal, they insensibly pass into each other by means of an intermediate structure, of which the prolabium may serve as an example. In particular circumstances, they change into each other, both in appearance and in function. Thus, in prolapsus of the gut or of the vagina, the discharge from the mucous surface subsides, the rugæ disappear, the membrane becomes thickened and indurated, and gradually assumes an appearance exactly resembling that of the skin. In natural paraphymosis, the delicate membrane

which, in the healthy state of parts, lines the internal surface of the prepuce, becomes converted into a cuticular membrane. In neglected and long-continued excoriation of the nates, the raw surface, which was at first tender and irritable, and discharged a serous fluid, becomes villous, less sensible, and discharges a fluid similar to a mucous secretion. In sinuses also of long duration, the secreting surface becomes changed, so as to resemble a mucous membrane, and the discharge, from being purulent or gleet, becomes mucous, or at least resembles a mucous fluid.

A mucous surface, when inflamed, at first furnishes a secretion, increased in quantity, and but little changed in appearance from the healthy fluid; afterwards the discharge resembles purulent matter, and is termed muco-purulent. When, however, the inflammation is violent, the discharge becomes bloody, or is altogether suppressed, and the membrane is thickened. Inflammation of a mucous membrane is very apt to spread with great rapidity, in this respect resembling the corresponding affection of the skin. It is attended with a sense of itching, and a burning pain. This pain is much increased by the parts being thrown into action, as in expelling their contents, chiefly if these be of an acrid quality. The membrane is thickened, and of a spongy appearance; its surface is red, and sometimes covered with flakes of lymph; occasionally it is much softened, and coated with a viscid adherent mucus; and it would appear, in many instances, that, in acute inflammation, the membrane is generally softened, whilst it becomes indurated from



chronic inflammatory action. When the inflammation is violent, and consequently rapid, considerable quantities of lymph are effused either above or below the membrane; and the lymph subsequently becoming organised, the membrane is much thickened, and a stricture is formed. The functions of a part lined with mucous membrane are more or less deranged in consequence of the vitiation of the secreted fluid.

In inflammation of this tissue, metastasis is also apt to occur, from one part of the membrane to another, and from the membrane to the external surface.

The passages, the internal surfaces of which are invested by a mucous membrane, are those subservient to respiration, nutrition, generation, and the urinary secretions; in other words, the mucous surfaces are the Pneumogastric and the Genito-urinal. Their particular diseases will be treated of in the second part of this work.

### *Of Inflammation of the Serous Membranes.*

ON such an extensive subject it is unnecessary to enter fully; not that the enquiry is uninteresting, or that a knowledge of the diseases of the internal cavities, and the mode of treating them, is not required of the surgical practitioner before he can enter into practice, with safety to his patients and comfort and satisfaction to himself, but we have a very important class of diseases to bring under review in a limited

space, whilst others treat of the mysteries of internal disorders, and promulgate the best modes of alleviating or curing them. It is, however, the province of the surgeon to treat the inflammatory affections of some of the serous membranes, and the consequences of inflammatory action in most of them; and it is therefore highly necessary that he understand the symptoms, progress, and consequences of such actions. The affections of the serous membranes are principally under the management of the physician; but they not unfrequently follow wounds and surgical operations, and the diseases of several of them are purely surgical. Inflammation of a serous membrane is attended with heat and pain, increased by motion of the parts and by pressure; the natural secretion is increased in quantity, the process of exhalation being incited, and that of absorption weakened; the serous fluid accumulates. The secretion becomes altered in quality, and assumes a milky appearance; lymph is effused, and floats in the fluid, or adheres to the surface of the membrane, which is rough and flocculent. The adherent lymph becomes organized, being penetrated by numerous blood-vessels; and thus the original membrane is, in many instances, much thickened, chiefly from the addition of new matter, though also from enlargement of its blood-vessels and opening out of the primitive tissue. When inflamed surfaces, which have been altered, both in texture and function, in consequence of inflammatory action, remain for a short time in contact with each other, lymph is effused and penetrated by blood-vessels from

each surface; thus the new deposit is organized, and forms a medium of connexion. By this process the parts are intimately united to each other, and consolidated into one mass; or are merely approximated and joined, at one or more points, by portions of lymph, in some cases thin and narrow, in others extensive and of considerable thickness; the adhering bands either extend in a straight direction, from one surface to another, or interlace, forming a sort of net-work. After adhesions of various kinds have been formed, they are often lengthened and attenuated in consequence of the motion of the parts, as is particularly the case with adhesions between the pleuræ costalis and pulmonalis. When they have been of considerable duration, they often resemble the original membrane from which they were deposited, becoming thin and transparent, smooth on their external surface, and furnishing a serous secretion. Not unfrequently, inflammatory action in this tissue terminates in suppuration; pus being secreted by the membrane, accumulates in the cavity formed by its expansion. By collections of matter, whether serous, sero-purulent, or purulent, within a serous cavity, the functions of the contained viscera are deranged, much impeded, and in many instances morbid actions are excited in them; the inflammation, whether it terminate in resolution, or proceed to serous effusion, adhesion, or purulent secretion, is also attended with constitutional disturbance, and the symptoms are proportioned to the original intensity of the action, and the extent and kind of its termination. The effusion of lymph,

and consequent adhesion, is, however, in many circumstances, a highly salutary process, as in wounds and injuries of the hollow viscera: effusion of their contents being thereby prevented, and the patient being saved from the danger attending violent inflammation of those cavities and their coverings, caused by the escape of a greater or less quantity of irritating extraneous matter. Purulent collections also in the solid internal viscera, are allowed to discharge themselves externally. The nature, symptoms, and consequences of inflammation of serous membrane, will be more fully considered under the diseases of particular parts.

*Of Inflammation of the Synovial Membranes, and Parts connected with them.*

IT occurs in consequence of wounds, bruises, and sprains, and often from exposure to cold: from the latter cause, the knee and elbow joints most frequently suffer, as they are generally more exposed to its influence, and not so well covered with muscular substance as the others.

There is heat, throbbing, pain, and swelling of the part, sometimes redness of the surface, and great constitutional disturbance; the symptoms and appearances, however, vary much, according to the extent of the joint which is involved. When part of the capsule is affected, the inflammation spreads rapidly over all the surface; the synovial membranes resembling the

serous in this respect, as well as in healthy structure and function. Like the serous, too, they are shut sacs, are smooth on their surface, and furnish a similar secretion, that of the synovial, however, being somewhat more glairy than the serous. Neither, in their healthy state, are possessed of much sensibility, nor are ligaments, tendons, tendinous sheaths, and bursæ, which two latter textures greatly resemble the synovial; when inflamed, they become most exquisitely sensible. The incited action of the blood-vessels is followed by increased discharge, which is less glairy and albuminous, partaking more of the serous character. When the incited action soon terminates, and the activity of the absorbents is diminished, the fluid accumulates within the joint, producing *Hydrops Articulæ*. This disease, however, may exist without previous incited action, the secretion being of its usual quantity, whilst the action of the absorbents is less than natural. The knee is more frequently the seat of dropsy than any other joint.

When the action is more violent, lymph is effused on the inner surface of the membrane, or is deposited amongst the ligamentous and cellular tissues external to the joint, in consequence of which, the membrane and external ligaments become thickened, and of an almost cartilaginous consistence. Serum is effused into the more superficial cellular tissue, filling up the hollows around the joint, concealing the protuberances of the bones, and producing a globular swelling. The articulating surfaces become ulcerated, and matter forms within the capsular ligament; or the

pus is deposited exteriorly to the joint, and gradually approaches the surface.

Along with ulceration of the cartilage, a portion of it may become dead, or either state may occur separately; and in many cases, the substance of the bone also becomes affected. These changes often compose the primary disease, and to them the affections of the synovial membrane and other parts succeed.

Such occurrences are attended with alarming disturbance of the constitution, with fever, and even with the most threatening and dangerous symptoms, such as delirium and coma. If the patient survive, and the matter be evacuated, hectic fever will supervene.

Affections of the membranes, cartilages, ligaments, and bones, often occur in weak constitutions, and proceed gradually. They are all classed under the general term of *White-swelling*, and generally present themselves without any assignable cause, or are attributed to the slightest injuries.

The term white-swelling is made to include all the different affections to which joints are liable in weak constitutions—thickening of the parts with an external colourless swelling—collections of matter about joints, with or without an external aperture—effusion of fluids into the cavities of joints, or into the bursæ—destruction of cartilage by ulceration, or in consequence of portions becoming dead—absorption, ulceration, caries, or intractable ulceration of the bone adjoining the articulation.

Those under thirty years of age are most liable to

chronic affections of the joints, and they often occur in early life. Occasionally, however, they are met with in patients further advanced in life, and I have known a man of sixty become afflicted with morbus coxarius.

Parents and friends will exert all their ingenuity to discover some sprain or twist, or squeeze from a tight boot, or a fall, to account for chronic disease of a joint, so as to save their whole generation from the imputation of being tainted with scrofula; and it is no doubt true, that people of the most healthy constitutions, if thrown out of health from any cause, will present all the appearances of scrofula, and become affected with chronic diseases of the mucous membranes, glands, joints, bones, &c.

Such affections advance slowly; all the articulations are liable to them, but those which are most subject to the disease are, the hip, knee, and ankle. Of these, the knee-joint is most frequently affected, probably from the greater extent of articulating surface. In young persons of unhealthy constitutions, the joints not unfrequently become affected one after another, and superficial abscesses form to terminate in open sores; these will often disappear on removal of the principal hectic cause.

The pain is in general trifling, and often not complained of, and swelling of the part from effusion into the joint or neighbouring bursæ, first attracts attention, after it has existed perhaps, in a slight degree, for a considerable time. The joint is stiff, and pain is experienced from extensive motion; on this account

the patient is disinclined to use it, and it is soon tired by the slightest exertion. The swelling becomes more solid, though still remaining elastic, and the feeling of fluctuation diminishes. Effusion of lymph follows that of serum, the latter having been absorbed; the motion of the joint is still further impeded, and the articulation is distorted; the patient keeps the limb in the most easy position, generally that of partial flexion, in which it becomes almost immovably fixed. The muscles, from disuse, shrink, the adipose substance is absorbed, the shafts of the bones also are diminished in size, and thus the whole limb is rendered slender and wasted, so as to make the swelling of the diseased articulation still more conspicuous. The bones are softened, and the muscles are of a white colour, as in the limbs of the paralytic or bed-ridden, and resemble more the cellular than the muscular tissue. The wasting of the muscles and loss of power, often precede the appearance of disease; this is frequently observed in the shoulder-joint, the deltoid shrinking, and almost disappearing, before any disease in the articulation is suspected. Not unfrequently, also, this wasting occurs without obvious cause, or any affection of the joint. When the disease is advancing, the patient may feel no acute pain, but merely a reluctance to use the limb, and from this, if long continued, the muscles, and afterwards the bones, become wasted. Wasting of the limbs in children, often of one of the lower, frequently arises from disorder of the bowels, and the irritation and debility attendant on teething.



The swelling is often irregular, being more protuberant at one part than another, from the fluid or the addition of solid matter being accumulated where the least resistance is afforded ; but the slighter inequalities are generally filled up by œdema of the cellular texture. As the disease proceeds, matter forms in the joint, and is often attended with great pain and fever ; or the pus is effused into the bursæ, into the surrounding cellular tissue, or into that beneath the tendinous sheaths of the muscles in the neighbourhood ; and being allowed to remain without an outlet, at length communicates with the cavity of the joint. Portions of the cartilages are absorbed, though this also occurs at the very commencement of the disease ; the subjacent bone becomes affected by ulceration, or perhaps its vitality is partially destroyed. When matter has accumulated, a portion of the capsular ligament generally ulcerates, the pus escapes, and is ultimately discharged externally.

Some have endeavoured to draw a distinction betwixt those cases in which the disease commences in the cartilage, and those in which the synovial membrane is primarily affected ; such knowledge, however, can be of no practical utility. When the disease begins with swelling which is of a chronic character, and produces but little inconvenience, and when the more urgent symptoms supervene after the swelling has continued for a considerable time, there is every reason to suppose that the disease has originated in the synovial membrane. But when the first symptoms have been pain and stiffness of the joint, without

change of its appearance, and when the swelling has occurred after these symptoms have been of some duration, then it is probable that the cartilages are the primary seat. For the most part, however, the symptoms are the same in all cases of chronic affections of the joints, and all the articulating apparatus are sooner or later involved. When cartilage has been extensively absorbed, a grating sensation is felt on moving the articulating surfaces of the bones upon each other.

Purulent matter not unfrequently collects in the substance of the bones, which in all cases ultimately become softened in a remarkable manner. In many subjects, without actual disease of the osseous tissue, the heads of the bones are so altered in consistence as to be easily cut with a knife.

It has been a matter of dispute, whether, in this affection, the articulating extremities of the bones are enlarged or not; and the supposition that they are always more or less increased in size, has arisen from the extensive effusion and indurated state of the parts being mistaken for this enlargement.

In the first stages of the disease, they are seldom, if ever, enlarged; but when ulceration of the bone has occurred, new osseous matter is deposited to a greater or less degree in the neighbourhood of the ulcer,—an attempt by nature towards a cure, but too often an ineffectual one. The bones, in strumous subjects, are often much enlarged, from collection of purulent matter in their substance giving rise to a sort of *spina ventosa*. In cases when the whole of

the articulating extremity of the bone is not enlarged, still that portion which is more immediately concerned in the articulation is often considerably expanded. Frequently when the knee is the seat of the disease, the lymphatic glands in the groin are enlarged; and when the elbow or wrist joints are affected, there is often a similar enlargement of the glands in the axilla: such glandular tumors have not rarely been confounded with those accompanying malignant disease, and measures which were absolutely necessary for the salvation of the patient, have thus been delayed or neglected.

When the disease has been of considerable duration, hectic fever supervenes, and is aggravated after the abscesses give way. The patient becomes much weakened and emaciated, and loses his appetite; the pulse is rapid, with night sweats, diarrhoea, &c.; and from a continuation of the hectic cause, the life is endangered. In some cases, however, the health is restored, and the disease abates spontaneously; in others, the disease is arrested, and a complete cure accomplished, by the careful employment of such means as will be afterwards mentioned.

A method of cure, resorted to by nature, and in which she may be assisted by the surgeon, is Anchylosis, ligamentous or osseous. New bone is deposited in the neighbourhood of the disease, whereby the ulcers become, as it were, cicatrized, and the articulating extremities of the bones are joined to each other by a firm osseous union, either universal, or composed of processes extending between the bones at various

points: or, in consequence of the effusion of lymph into, and the consequent thickening and induration of, the ligamentous substance exterior to the joint, this connecting medium is so strengthened and concentrated as to retain the articulating surfaces in exact apposition; from one, and usually from both, of these changes, the joint is securely fixed and rendered immovable. But after this, the disease is still apt to recur from slight causes, the bony or ligamentous union being disturbed or destroyed, and the original disease attacking the parts with fresh activity; abscesses form, may be extensive both in size and number, and thereby the health is again undermined. So that the patient, after undergoing much suffering and risk, preserves, for a few years, a limb which is almost useless to him, only that it may be removed. In other cases, the union is permanent, the disease does not return, and, by care and time, the limb is brought into the most convenient position, and proves of considerable service.

The appearances produced by inflammation, and disease of the synovial membrane, are the following. In the first stage, the internal surface of the capsular ligament, and the rest of the synovial membrane, is found of a red hue, its formerly colourless vessels being now made apparent, from enlargement and consequent injection with red blood; and the serum within the cavity of the joint is greater in quantity than in the natural state. When the disease has been of longer continuance, the membrane is found considerably thickened, its usual smooth glossy sur-

face is destroyed, it is irregularly flocculent, and frequently of a light yellow colour; in some cases it is softened, in others it is indurated, and sometimes of a semicartilaginous consistence.

The interarticular adipose tissue also seems to be increased in volume, from being infiltrated with a serous fluid, by the discharge of which the diseased blood-vessels have attempted to relieve themselves. When the inflammation has been intense, or of long duration, lymph is secreted, and deposited on the external surface of the membrane, forming an intimate union between it and the ligaments, and producing thickening of the external apparatus. Or the lymph is also effused on the inner surface of the membrane, to which it adheres and becomes organized; and this organized effusion is often so extensive, as to conceal almost the whole of the synovial membrane, excepting portions of its delicate reflexions which invest the articulating cartilages. By the lymphatic deposit, to a less degree, the folds also of the synovial membrane adhere to each other, whereby the motion is still farther impeded, and the pain, when attempted, increased. Occasionally the synovial membrane is found enormously thickened, much softened in texture, and of a brown hue, when the disease has been of a very chronic character. Along with these appearances, serum is generally found effused, in a greater or less quantity, into the cellular tissue exterior to the ligamentous covering. If the inflammation have terminated in suppuration, purulent matter will be found within the joint, and its quantity will vary according

to the degree to which the cavity has been dilated. And in cases in which the matter has remained long within the cavity, the synovial membrane and the ligaments become blended into one soft mass, the internal surface of which is lined with a thick coating of lymph, as in the case of common abscess. If purulent matter is effused externally, and communicate with the joint, the capsular ligament will be found to have ulcerated and given way at a certain point, forming an aperture, usually of small size, and with ragged margins.

All these appearances may exist without disease of the cartilages or extremities of the bones; but generally they are also affected at the same time. At first the surface of the cartilage is slightly irregular and rough, and the change is not observed, unless on minute inspection. Afterwards the surface is marked with small depressions, which may be numerous, and are surrounded with irregular and somewhat serrated margins. They gradually increase in depth and extent, and the subjacent bone is ultimately exposed at one or more points. Often the greater part of the cartilage is removed by absorption; the bone is thus exposed, opened out in its texture, softened, of an irregular surface, and in some places depressed, containing a thin ichorous fluid, while the process of ulceration has also extended to the osseous tissue. In other cases, portions of cartilage, ragged, of an unusually white colour, and partly dead, are slightly adherent to the subjacent bone, or to the surrounding portions of sound cartilage.

The incipient stage of such disease may exist without the synovial membrane being much, if at all, affected; but when the ulceration has made farther progress, all the articulating apparatus is more or less diseased.

*Of Coxalgia, Morbus Coxarius, or Hip-joint Disease.*

THIS disease has been supposed to commence in the cartilages; it appears, however, to originate indiscriminately in the cartilage and the bone, as well as in the membrane lining the capsule and investing the cartilage, and the ligaments; but it is of little or no consequence in which of these textures it begins. It affects patients of all ages, though children under twelve are most generally its victims; and in these it often makes considerable progress without its existence being suspected. The patient is observed to be a little lame, and to be awkward in the use of the affected limb, but he experiences no pain, and if he does, it is of a dull kind, and generally referred to other parts. Thus, pain in the knee is generally the prominent symptom of this affection, and occasionally pain is also referred to the ankle, or to the sole of the foot; and careful study and considerable experience are here required, to guard the young practitioner. Parts remote from the seat of morbid action have often been made the subject of treatment in this and other affections; the knee, in morbus coxarius, has

been leeches, poulticed, blistered, and burnt, and that, too, when the knee was not at all altered in appearance, and showed no symptom of disease.

Again, and particularly in adults, the limb is easy only in certain positions, and cannot be moved without great suffering; pain is also complained of in the groin, and often immediately behind the trochanter major. If an examination is made when the patient is thus halting, and even though he complains of no pain, the limb is found shrunk, wasted, and *lengthened*. The elongation of the limb occurs from swelling of the parts composing the joint, and from inclination of the pelvis towards that side. The lengthening is often great, and its extent is ascertained by accurate comparison of the two limbs, laid in contact when the patient is in the recumbent posture.

When the patient stands, the affected limb is considerably advanced before the other, on which the weight of the trunk is chiefly supported, the knee is generally bent, and the toes only rest on the ground. During progression, the patient often moves the affected limb with the hands grasped round the thigh, and contrives that it shall support as little as possible of the weight of the body. The spine is frequently affected, becoming bent in different directions, to preserve the equilibrium of the body; and a deformity of the trunk to a great degree occurs, which, however, may be remedied, at first, by confinement to the recumbent position. The nates are much altered, they become flattened; and those parts which are naturally most prominent, are reduced to the level of the



others; the usual niche between the buttock and thigh, in the erect position, is effaced, and the upper part of the thigh is often considerably swollen. The alteration is at once manifest on contrasting the healthy with the diseased side. In the morning, the motion of the joint is constrained and stiff, and locomotion is difficult; afterwards, however, the patient walks with more ease, though still by very slight exertion the limb is speedily tired, and he is unwilling to use it. Pain is produced by pressing on the groin, or by tapping on the trochanter, and by pushing the head of the femur forcibly against the acetabulum. The inguinal glands occasionally become enlarged. As the disease advances, the lameness is more apparent; pain is produced and increased by motion, and by any attempt to stretch the limb whilst in the recumbent posture. The emaciation of the limb becomes more and more visible, and the constitution often remarkably sympathises; hectic fever supervenes, with its usual train. The degree of violence in the symptoms is very various; and it sometimes though rarely happens, that the disease exists, even extensively, and proceeds to a favourable spontaneous termination, without the patient suffering much pain; at least without his being obliged to desist from his usual labours.

Such are the circumstances attending the first stage of the disease, in which the limb is lengthened, and there is no decrease, but an enlargement, of the parts composing the joint. When, however, absorption occurs, and the articulation begins to be destroyed,

the second stage of the disease commences, and the limb becomes sensibly shortened; the toes are turned inwards or outwards; in many cases there is every appearance of dislocation of the thigh upward and backward; and in others the limb is much bent, the toes only reaching the ground. The position of the limb will depend much on the extent to which the head and neck of the femur is destroyed, and also on the portion of the acetabulum which is most diseased. The joint becomes tender, the slightest motion causing much pain, and the parts around appear swollen. The patient retains the limb in the most comfortable position, and it is generally bent upward towards the pelvis. In many cases matter forms behind, or rather below, the trochanter major, and the collection often attains a large size. When the presence of matter has been ascertained in this situation, it has been recommended that an early opening should be made, on the supposition, that the disease arises from an acrimonious discharge into and round the joint, and that, by the matter being allowed to escape, the cause of the disease is removed. Though the principle is incorrect, still the rule of practice is important; for in consequence of the long-continued presence of matter, accumulating in a cavity which is not dilated in proportion to the increase of purulent secretion, or even not confined by a limited cyst, the original affection will be much aggravated, and disease induced in the neighbouring parts. On discharge of the matter, the painful feelings usually subside. The formation of matter is preceded by great pain, and

frequent startings of the limb during sleep, accompanied with fever, and other symptoms of severe constitutional disturbance. By these symptoms, and the profuse discharge, which may be evacuated from several openings round the joint, the patient is much exhausted, and often sinks. In some instances the spontaneous cure by ankylosis occurs; or when the femur has been dislocated, the disease sometimes gradually abates, and a sort of new joint is formed; and occasionally the limb, after some time, becomes useful to the patient.

In many cases, the appearance which the various parts of the diseased joint present, are similar to those which have been already described when treating of affections of the joints generally. Frequently, however, the osseous tissue in this situation is much more extensively affected. Often the whole cartilage on the head of the femur is completely removed, exposing the bone in an ulcerated condition; and when the system has long borne up under the disease, the greater portion of the head, neck, and even of the trochanter, is destroyed, the extremity of the bone being completely altered in form, and composed of a loose, spongy, cancellated structure. A similar disorganization occurs in the acetabulum; the cartilage is often wholly removed, and the margins of the acetabulum absorbed, merely an ulcerated depression being left for the reception of the diseased femur; in other instances the margins remain unaffected, whilst the ulceration proceeds in the centre, and the cavity is thereby much deepened. Not unfrequently the

ulceration proceeds farther, and an aperture is formed in the acetabulum, into which the femur is lodged, and matter consequently accumulates within the pelvis, beneath the iliacus muscle. When matter has formed in the soft parts round the joint, portions of the bones of the pelvis, in contact with the pus, are ulcerated to a greater or less extent, and sometimes these ulcers are surrounded by deposits of new bony matter.

From such changes in the osseous parts of the articulation, the limb is shortened, sometimes to a great degree, though no dislocation has occurred. Indeed, dislocation is by no means so frequent a cause of the shortening as is generally believed.

If the head of the femur has been dislocated, and if the disease in the joint has afterwards subsided, the acetabulum is found to be much contracted, with its margins smooth and little elevated, and if the patient survive for a number of years, it will be almost wholly obliterated. But a portion of the dorsum of the ilium, upward and backward, which is the most frequent dislocation in this disease, is gradually absorbed, so as to form a cavity for the reception of the femur, the extremity of which becomes more solid in texture, and more smooth in its articular surface. Whilst a depression is thus formed, new bone is deposited round its margins, whereby the cavity is increased in depth, and resembles the original acetabulum, the new deposit having become smooth and of a regular form. The osseous matter in this situation is often secreted in too great abundance, so that the margin is much elevated, and confines the extremity

of the femur ; to this occurrence the restrained motion of the limb is to be partially attributed. In many cases the new acetabulum is almost entirely formed by the deposition of new bony matter, which gradually adapts itself to the extremity of the femur.

*Treatment of Affections of the Joints.*—After the infliction of a wound, accidental or not, in order to prevent inflammation of a joint from becoming violent, it is of the utmost importance to bring the edges of the wound into close apposition. Sometimes local action, or disturbance of the constitution, does not supervene on an opening, even of considerable size, being made into a joint ; while the slightest puncture often gives rise to the most dreadful symptoms, both local and general. An incised wound, of no great extent, will be sufficiently closed by the careful application of adhesive plaster, and attention to the position of the limb ; but if it is extensive and lacerated, stitches become indispensable. The parts must be kept in a state of complete rest, and cold cloths applied. The patient's bowels must be freely opened, and he is to be kept on low diet. If inflammatory action occur, bleeding, locally and generally, must be had recourse to with great activity, accompanied with warm fomentations to the parts ; and at the same time, preparations of antimony, and other saline medicines, are to be administered internally. If there be reason to suspect the formation of matter, the parts ought to be attentively examined, in order to detect its presence ; and when discovered to exist, it must be

evacuated without delay. In chronic cases, even local bleeding to any great extent is inadmissible. In some a few leeches may be applied, and followed by counter irritation, with advantage. The employment of counter-irritants is, perhaps, chiefly to be trusted to in the treatment of chronic affections of the joints. Of these, blisters are most in use; though, from my own experience, I cannot much recommend them. Their constant repetition is exceedingly annoying, and the slow progress which is made towards a cure under their use is far from encouraging. Tartrite of antimony, applied in the form either of ointment or of plaster, is generally productive of much advantage, by causing a great degree of superficial irritation, and relieving the internal parts; after the pustules have been fully developed, its use is to be discontinued till the surface be nearly whole, when it is again to be resumed, if the recurrence of painful feelings demand this. Caustic issues have been much praised, and are often highly beneficial; an eschar is made by the caustic potass applied to the skin, or by rubbing the muriate of mercury, or any other caustic, into scarifications made by the lancet; the slough separates, and pus is discharged; and instead of promoting a continuation of the discharge, by applying savine ointment, or other irritating dressings, it is better to allow the parts to heal, and then to repeat the application of the caustic.

The employment of the muriate of mercury, though a most efficient escharotic, appears not to be unattended with danger, as in many instances violent purging,

with tenesmus and bloody stools, follows its application. In some cases, the moxa is a more effectual remedy than issues formed by caustic. When swelling exists without pain, considerable advantage may be derived from frictions, and liniments of various kinds, with careful bandaging. Applications can be of little avail, unless the joint be kept completely at rest.

When there is no pain in the joint, when swelling exists, with or without fluctuation, and there is every reason to believe that the extremities of the bones are not much diseased, a cure may be, in general, obtained by the employment of pressure, rest, and slight superficial excitement. But to disease of the shoulder and hip-joints this practice is not very applicable. The joint is well washed with soap and water, and afterwards rubbed with camphorated spirits of wine; it is then covered with an ointment spread on lint; ~~and~~ composed of equal parts of the unguentum hydrargyri cum camphora and the ceratum saponis—in many cases the mercurial ointment had better be omitted: strips of adhesive plaster are then applied tightly round, from two or three inches below the joint, to the same distance above it; these are covered with soap-plaster spread on thick leather; and the whole is surrounded with a bandage, which extends from the extremity of the limb. The bandage should be put on, as far as the joint, before the plasters are applied. The irritation produced on the surface tends to check the disease, whilst the compression excites the action of the absorbents to remove the effused matter, whether lymph, serum, or pus, and thus to reduce the swelling;

and by the joint being kept completely motionless, not the least salutary indication of the treatment, the cartilages and bones, if ulcerated, are placed in a condition tending much to expedite, and in some measure to cause, restoration to their natural state ; and if they are diseased to such an extent, that the process of cicatrization cannot be expected, the spontaneous cure by ankylosis is, by these means, much more likely to occur. The dressings may be left undisturbed for the space of a month ; at which period, and in many cases sooner, they will be found much slackened, in consequence of the swelling being greatly reduced. By repetition of the application at intervals, the disease will, in a great many instances, rapidly cease, and the joint resume almost its natural appearance ; but the period at which this takes place will be found to vary much according to circumstances. If, however, the plasters produce such irritation as to cause a return of inflammatory action, their use must be discontinued till such action have been subdued by the usual means. If the thickening of the external parts has occurred to such an extent as to cause immobility of the joint, or if partial ankylosis has ensued, the limb may be brought to the most convenient position, by the cautious use of a splint retained by the bandage. The practitioner is not to be deterred from having recourse to the above practice, even when matter has collected and burst externally, for often, by its employment, the cavity of the abscess contracts rapidly ; and on removing the first dressing, the external opening is found cicatrized. After the swelling, and other



symptoms of disease, have subsided, the joint is to be slightly moved, but with great care; and by a gradual increase of the movement, the natural motion of the part may be ultimately restored.

When the occurrence of ankylosis affords the only hope, this process ought to be encouraged by rest, and the limb at the same time kept in that position which will be most useful in after life; this will be effected by the employment of splints.

Notwithstanding every thing that can be done, the disease often runs its course, abscesses form and give way, the patient's health declines, and he becomes emaciated and hectic. In such cases amputation, when not contra-indicated by internal disease, must be had recourse to, as the only means. In some few instances, the excision of the diseased extremities of the bones may supersede this operation; but this will be discussed in a future part of the work. Every circumstance must be well weighed before mutilation be resorted to; and there can be little doubt, that many limbs have been saved by the employment of the means above mentioned, which would have been otherwise doomed to amputation.

*Hydrops articuli* will in general be got rid of by the use of friction, either dry, or with liniments; by stimulating plasters, or by blisters; and by the proper application of bandages. Mercurial ointments are used in this affection, and often with very great benefit. Electricity has been recommended.

BURSÆ are lined by a membrane, greatly resembling the synovial in appearance, function, and dis-

ease. They are frequently the subjects of inflammation of an acute character, but in most instances the action is of short duration, and generally terminates in an increase and accumulation of the secreted fluid. The attendant pain is very severe, and much increased by any motion of the neighbouring parts.

Occasionally a portion of condensed cellular substance assumes the appearance of a bursa, secretes a similar fluid, and is similarly affected in consequence of inflammation.

Disease of the bursæ may occur from external injury, and often they become affected subsequently to disease of the neighbouring joint. If the action is violent, lymph is effused on the inner surface, or external to its cavity, causing considerable thickening. Occasionally the action terminates in suppuration, pus being effused to a greater or less extent into the cavity; and if allowed to remain or accumulate, the abscess extends, and frequently communicates with the neighbouring joint, which may not have been diseased. In chronic cases of enlarged bursæ, especially of the bursal thecæ of the tendons of the wrist or ankle, we not unfrequently meet with loose cartilaginous bodies, of various sizes, and of a flattened oval form, floating in the accumulated fluid. They have been supposed to be formed by portions of lymph having become detached, and being much condensed in structure. When inflammatory action has commenced, it must be subdued by copious topical bleeding, along with the exhibition of purgatives; in most cases general blood-letting will not be required.

After the inflammation has subsided, the parts remain swollen, either from the effusion of serum or lymph; then stimulating applications may be employed with advantage. When suppuration has occurred, in many instances it will be prudent to evacuate the matter by an incision, in order to prevent farther mischief, especially if the bursa is in the neighbourhood of a joint. After the matter has been evacuated, the cavity gradually contracts, and ultimately the bursa is completely obliterated. Diseased bursæ, near the surface, and unconnected with important parts, have been dissected out. The operation is unnecessary, painful, and hazardous.

*Of Inflammation of Bone, and Diseases thence arising.*

BONES grow and are nourished by the same means, and are subject to the same laws, with other parts of the system. Like all the tissues of a white colour, particularly when their growth is completed, they are less freely supplied with blood-vessels and nerves than other parts. When incited action of the blood-vessels occurs in the harder textures, sensibility is roused to an exquisite degree, and the healthy and perverted processes often advance with great vigour and amazing rapidity.

Inflammation of bone often arises from external injury, and in some constitutions from very slight causes. Its occurrence is supposed to be favoured by

a syphilitic taint, but the inflammatory disposition is much more frequently produced in a system vitiated by the abuse of mercury. From the unyielding nature of the tissue, the pain attendant on inflammatory action is dreadfully excruciating; it is also most violent during the night, even in chronic cases, a circumstance which does not admit of satisfactory explanation. The integuments over the inflamed bone are swollen, and the tumour is œdematous; whilst a hard and solid tumefaction exists in the more deeply-seated parts, caused partly by enlargement of the osseous tissue, and partly by effusion of lymph into the cellular substance. The bone is imbedded in a gelatinous or lymphatic effusion, situated beneath or external to the periosteum; this membrane is more vascular than in its natural condition, thickened, and at the same time opened out in texture. The blood-vessels of the affected bone are much increased, both in activity and in size; and, as a consequence of enlargement of the vessels, and thickening of the naturally delicate membrane on which the vessels ramify, the bone is increased in size, its texture is loose, sometimes resembling the cancellated structure, and its surface is occupied by numerous foramina, which are enlarged in proportion to the size of the vessels which they contain. The limb is often enormously swollen and indurated. The gelatinous effusion beneath the periosteum speedily becomes organized, nodules of osseous matter project into it, and adhere to the surface of the bone, generally by a narrow neck; these increase in number,

gradually assume a solid appearance, and thus the bone is thickened, often to a very great extent; and the texture of the bone becomes greatly condensed by absorption in some degree keeping pace with the secretion of osseous matter, both from the vessels which ramify throughout the substance of the bone, and from those which supply the more external parts.

It has been supposed that the new osseous matter is deposited almost entirely from vessels of the periosteum, but it is only secreted by the vessels which ramify within the substance of the bone, and by the vessels of the periosteum *after* they have entered the osseous tissue. Thus, in the case of fracture, the new osseous granulations are uniformly found adherent either to the broken surfaces, the vessels of which are enlarged and increased in activity, or to fragments which have been detached and retain their vitality, but not to the under surface of the periosteum. There is no doubt that thin laminae of bone are occasionally found attached to the periosteum, or impacted within its substance; but this is to be attributed to that morbid action of the tissue, to which, along with several other membranes, it is subject.

We not unfrequently find earthy matter adhere to the dura mater, to the pleura, and also to the peritoneal covering of the uterus, yet no one will assert that these membranes are destined to form or repair bones; and so it is with the periosteum. In the healthy state of the system, the blood-vessels of each part repair any breach of surface by a substance closely resembling the primary tissue; solution of

continuity in the skin is repaired by the production of a cutaneous substance ; in muscles, the repairing substance comes to resemble the muscular tissue ; and in like manner new bone is deposited by the vessels of the old. If it is asserted that those of the periosteum are the repairing or secreting vessels, we may, with equal propriety and truth, attribute reparation of the skin to muscular blood-vessels, and *vice versâ*.

When bone is extensively affected with inflammation, motion is impaired ; the muscles being displaced and retarded in their action by the swelling and irregularity of the substance of the bone ; and perhaps also by their partaking, in some measure, of the inflammatory action ; so that any attempt to move the parts very much aggravates the patient's suffering.

Occasionally inflammation attacks almost all the bones in the body, and producing great constitutional disturbance, as well as exhausting the powers of life, soon terminates fatally.

Bones are liable to be inflamed from various causes ; and, from whatever cause, the action ends, as in the other tissues, in resolution, suppuration, or mortification. The effusion by which the diseased vessels naturally relieve themselves in softer textures, cannot here take place so readily or to such an extent as to prove beneficial ; the intensity of the action is with difficulty subdued, and, consequently, resolution is comparatively rare ; when it does occur, the parts do not soon regain their natural condition, but often remain considerably swollen and indurated ; as is seen in nodes, which continue during the life of the patient,

without causing pain or much inconvenience ; and when deposition of new bone has occurred to a considerable extent, the limb may diminish somewhat in size, but seldom, if ever, regains its former shape.

Suppuration in the surface, or in the centre, and partial or total death of a portion, of bone, are the most frequent consequences of external injury or incited vascular action ; and suppuration in the cancellated texture frequently follows very slight incited action in those of a scrofulous habit. Suppuration in bones is necessarily connected with loss of substance, and condensation of the surrounding parts ; and purulent collections exteriorly, if allowed to press long, or if bound down by unyielding sheaths, will sooner or later produce a breach of continuity, by causing absorption of the outer lamella and the subjacent cancellated texture. A similar effect is produced by aneurismal and other tumours. Such loss of substance is, in some instances, speedily repaired, after removal of the cause, by effusion of new matter from the surrounding blood-vessels of the bone ; thus, in disease in consequence of pressure from aneurism, we frequently observe that the healing process commences as soon as the aneurismal sac begins to diminish. But, as has been already observed, the healthy actions are more vigorous in the softer tissues than in bone, and when ulceration has occurred in the latter, it is generally attended with weak action, and presents the same general characters as an ulcer in the soft parts, connected with a feeble action of the blood-vessels ; the discharge is thin and fœtid, absorption gradually ex-

tends, and there is little or no effort towards reparation. It may therefore tend to prevent confusion of the two different morbid states, if we confine the term *ulceration* to suppuration and absorption of bone, whilst the vessels retain a considerable power of action, throw out new matter, and procure a reparation of the breach ; and this condition of the osseous tissue exists when the disease is situated in the surface of the bone, and when it has been produced by an external cause. On the contrary, the term *CARIES* will describe that peculiar *kind* of ulceration in which reparation is hardly attempted by nature, and is with difficulty obtained by the most active interference ; and this disease will most generally be found to affect the cancellated structure. The comparative frequency of one or other of the terminations of inflammation depends much on the kind of bone implicated.

*Caries* almost uniformly occurs in the heads of long and in the cancellated structure of the short bones, in the same way that unhealthy suppuration most frequently takes place in the loose cellular substance of the soft parts. When matter has formed in the substance of a bone, the outer lamella becomes absorbed, and the effusion undermines the periosteum, which, from the distension, also ulcerates, and the matter spreads into the neighbouring cellular tissue, or makes its way to the surface, and is evacuated. The discharge is often continued in consequence of a dead portion of the cancellated structure being imbedded either in the carious cavity, or in the soft parts.

It was formerly remarked that bones become highly



sensible from incited action ; hence in the commencement of this disease, which is attended with more or less inflammation, the patient generally suffers most excruciating agony—so great in general as to prevent him, perhaps for weeks, from enjoying the least repose. The affected part is considerably swollen, but the enlargement is seldom so general or so great as in the diseased state of the ligaments and other apparatus of a joint. White swelling, however, may be the precursor of caries ; or, in other words, a disease commencing in the bursæ ligaments, synovial membrane, &c. may extend to the bone ; and breach of continuity, attended with weak action, be the consequence. In caries the affected portion appears neither to possess vitality enough to enable it to repair the breach, nor to be sufficiently deprived of vitality to be thrown off by the surrounding parts. When the parietes of the cavity have remained a considerable time in this inactive state, the surrounding vessels become more active, and the surface of the bone in the vicinity is studded with nodules of new osseous matter. This is not in general limited to the affected bone, if one only be the seat of the disease, but frequently extends to those articulated with it. The soft parts are commonly more or less thickened and rendered exceedingly dense by effusion of lymph into the cellular texture ; and so great is this thickening sometimes, that the knife is resisted as if by cartilage. The discharge which proceeds from the carious part is highly fœtid, very profuse, is often poured through several openings, and the surrounding skin is exco-

riated and generally of a livid colour. The ichorous discharge occasionally dries up for a short period, and again breaks out more violently. The surface of the ulcer is, in some cases, occupied by soft unhealthy granulations, in others the earthy part of the bone is most prominent. When the parts have been macerated and dried, the disease is often found to have proceeded more in width than in depth, and the absorption has not reduced all points of the diseased surface to the same level, thin portions remaining somewhat elevated, and giving the part a cancellated appearance; and there often project numerous minute osseous fibrillæ of considerable length, which intermix with one another, and form a most delicate network. In other instances, the ulceration has extended more deeply, and a considerable cavity is formed, with irregular margins and surface; and not unfrequently it contains dead portions of the cancellated structure, in some of a dark, in others of a light colour; or it is occupied, in the recent state, by a substance resembling lard. The surrounding bone is much softened, and, after maceration, becomes exceedingly light. The disease is generally confined to one or two bones, but occasionally involves a whole chain. It may be limited to a part of one bone in a joint, or may embrace the whole of it. Its extent will depend on the severity of the primary action, or on the degree and duration of the pressure which has been allowed to exist, whether from the nature of the superincumbent texture or the carelessness of the surgeon.

*Interstitial* absorption often occurs in the tarsus

and carpus, of those bones which are in the neighbourhood of the carious ulceration. The superincumbent integuments are livid and cold, and pain is felt in the situation of the bones; yet they are not affected with continuous ulceration, but portions of their substance are gradually removed by absorption, so that they are much loosened in texture, and may be altogether destroyed, or come to consist merely of a thin and reticulated osseous shell; whilst at the same time their cartilaginous surfaces remain in their healthy condition.

The constitutional disorder attendant on caries is at first very great, the sympathetic fever is followed by hectic, under which, and the discharge, many patients sink. The general affection, in some degree, keeps pace with the local, in violence and duration. The irritation is in some cases so great, as to destroy the patient in a very few months or weeks; but not unfrequently a constitution, by no means strong, will be enabled to bear up for a long period under very extensive disease of a bone. The paroxysms of pain and inflammation occasion fresh attacks of constitutional derangement; this occurs till the patient's health and strength are exhausted, and he sinks under the disease, or is relieved by the spontaneous or artificial removal of the cause.

A natural cure of caries may occur in consequence of the diseased parts so far recovering their natural degree of vascular action, as to form granulations, and repair the breach; but most frequently it is necessary, for the accomplishment of this purpose,

that incited action occurs to a very considerable degree; and the diseased parts, already extremely weak, have not sufficient power to withstand the action, but die; whilst the action of the surrounding parts, not being increased to such a degree as to overcome their powers, throws off the dead, secretes a more bland discharge, and deposits healthy granulations to gradually fill up the cavity.

*Treatment.*—In inflammation of bone, resolution must be accomplished, if possible; the other terminations are to be deprecated, since they frequently endanger the limb, and even the life, of the patient, and, at best, never admit of a speedy cure. To promote resolution, blood must be drawn copiously from the part; and general bleeding may also be required, though in some constitutions it cannot be safely carried to any great extent. After local bleeding, fomentations assiduously applied will tend much to relieve the sufferings of the patient. Purgatives, nauseating doses of antimony, and all safe measures likely to subdue the vascular action, must at the same time be adopted. Free incisions sometimes relieve the pain, and cut short the disease, the distended vessels being thereby emptied; but such practice is only a last resource, when the action has resisted all other means, and threatens an unfavourable termination. If, notwithstanding the resolute means employed, the inflammation proceeds unabated, and suppuration occurs, the effused pus ought never to be allowed to remain on the surface of the bone, but must be evacuated by early incision. Otherwise, the pressure of the extra-

neous fluid will cause absorption of the bone, the absorbed surface will, in its turn, secrete pus, and thus an ulcer will be produced; and, from the vascular action becoming debilitated in consequence of the previous incitation, that ulcer will in all probability degenerate into caries. Much mischief is produced by squeezing and bandaging tightly the inflamed parts, as can readily be understood; yet such practice is frequently adopted after suppuration. By it the inflammatory action is excited anew, the formation of matter is very much increased, and however useful such manipulation may be in stiffness of a joint, or mere swelling of bursæ, sheaths, &c., still, in inflammation and abscess of bones or joints, it is extremely prejudicial, and from its indiscriminate employment by those ignorant of the profession, many limbs have been destroyed. General chronic periostitis, which is produced by exposure to cold, or occurs after or during mercurial courses, and then is supposed to be a symptom of syphilis, is often relieved by the internal exhibition of the muriate of mercury, or other mercurial preparations, combined with sarsaparilla and diaphoretics. In many instances, such an affection will yield to no other treatment; and thus the practitioner is occasionally obliged to have recourse to a somewhat paradoxical practice, giving mercury for a disease which seems to have been produced by that mineral. In inflammation of the short, or heads of the long, bones, if the action do not yield to topical bleeding, counter-irritants must be employed; and of these, perhaps, the moxa is the most effectual.

In all deep-seated pains of the bones, this remedy affords the most speedy and complete relief, at the expense of but a trifling pain of no long duration, and subsiding immediately on the application of lint dipped in cold water or in aqua ammoniæ. In some cases, the moxa is to be applied so as to induce a deep eschar; in others, so as merely to irritate the surface. Caustic issues are also of service. During the adhesion of the eschar, the best application is a common poultice, which, on the separation of the dead part, may be exchanged for any simple ointment. The sores following the use of the moxa are in some instances tedious in healing; and this may be ascribed to the vitality of the surrounding parts having been diminished by the application.

When caries is established, and the integuments have given way, the best and most successful proceeding is that pointed out by nature—destruction of the diseased portion; and the means must vary according to the particular circumstances. In many cases, nature seems to wait but for the separation of the sickly parts, either by accident, or by the interference of art. The means are to remove, partially or wholly, the diseased part, or to effect such a change of action, as will throw it off. The first indication will be accomplished by trephines, scoops, saws, forceps, &c.; the second by the cautery; frequently both are required. In caries of the long bones, it is in general necessary to enlarge the opening through the outer lamella by the trephine; and if the disease be extensive, different perforations thus made may be con-

nected by a small saw, or the cutting forceps. The diseased cancelli, thus exposed, can be readily removed by the scoop or graver. If, with the probe, it is ascertained that a portion of the cancellated texture has become dead and loose, it is to be removed after dilatation of the external opening. It may frequently be difficult to distinguish, in the effused blood, between what is diseased and what is not; in which circumstances, it will often be prudent to cauterize freely the exposed surface, and for this purpose the oxidum hydrargyri rubrum ought generally to be preferred. The slough will soon be thrown off, and healthy granulations fill up the breach. The application of the actual cautery may be found necessary; at one time I employed this remedy very extensively in caries, and often with most marked success; I have since, however, been led to change my opinion, and am now inclined to prefer the potential cautery already mentioned. By the application of the red-hot iron, the diseased portion is destroyed effectually, but at the same time the vitality of the surrounding parts is often very much diminished, so that they are incapable of assuming a sufficient degree of action for throwing off the dead part; and their action being increased whilst their power is diminished, they may become affected with caries, and thus, instead of being arrested, the original disease will either be increased, or extensive necrosis may take place. The red oxide of mercury is not calculated to produce such bad effects, and is sufficiently powerful for complete destruction of the diseased parts. It will be necessary

to keep the wound open, by proper dressings, till all the dead portions of bone be discharged, and every part of the parietes of the cavity produce healthy granulations; and if the discharge be offensive, its fœtor may be corrected by the use of spiritous applications, such as the tincturæ myrrhæ, opii, aloes, &c. separately or combined. After healthy granulations have appeared, and the cavity has begun to contract, light dressing is all that is necessary.

In operating on the carpal and tarsal bones for removal of caries, the surgeon ought to be acquainted with the connexions and relations of the parts. If one bone is diseased, its removal will be sufficient; if several, the operation becomes more painful and difficult.

When one of the tarsal or carpal bones is almost completely destroyed, and the surfaces of those articulated with it are also more or less affected, it is not sufficient or safe merely to remove the loosely attached portions of the one primarily attacked; the diseased parts of those surrounding it must also be taken away, and it will often be necessary to apply the caustic afterwards. In caries of the distal range of bones, the bases of those supported by them are in general involved, and must be also removed. If one only is diseased, with the base of the metacarpal or metatarsal bone attached to it, the removal of these will be enough, and can be accomplished without difficulty. Some have recommended the total extirpation of a metacarpal or metatarsal bone, leaving the finger or toe appended; but these, when thus left,



can never become of any service to the patient, and may be productive of much inconvenience; whilst removal of them, along with the diseased bone, renders the operation much more easy of execution. If the whole disease can be extirpated, leaving the surfaces of the surrounding bones covered with healthy cartilage, the use of the cauterly is not required, and would be productive of harm; but wherever it is impossible to avoid encroaching on the cancellated texture, such as of the os calcis, which it would be unsafe or imprudent to take away entirely, its use is then indispensable. After the removal of carious bones, the symptoms soon disappear, and the patient obtains a rapid, and often permanent cure. The instruments for these operations, and the method of performing them, will be afterwards mentioned. The temporary cicatrix of a sore leading to the diseased bone has a very different appearance from the sound scar which is formed after their removal. The former is bluish, soft, on a level with the surrounding parts, and moveable; the latter is depressed, white, and firmly adherent to the bone.

*Death of Bone*, or NECROSIS, is an effect of violent inflammation or external injury; a termination of inflammatory action in bone corresponding to sphacelation in the softer tissues. It has been observed, that the bones are not extensively supplied with blood-vessels, and that their natural powers are inferior to those of the softer parts; and from this circumstance the frequency of necrosis can be readily accounted for.

The short, and the heads of the long bones, are more vascular than the flattened, and the shafts of the long. Hence necrosis most frequently occurs in the latter. External injury may produce this disease by causing a violent increase of action, and it may be so severe as at once to deprive part of the bone of its vitality. Destruction of the periosteum, and of the vessels which enter the surface of the bone, frequently gives rise to superficial necrosis or *exfoliation*. Such a result, however, does not always follow ; for we not unfrequently find, when the periosteum has been forcibly torn off, to a considerable extent, by external injury, that the part still retains its vitality. When, however, the bone has been at the same time contused, it is extremely probable that external necrosis will occur. Again, when the periosteum has been removed in the most careful manner possible, exfoliation occasionally takes place. If the exposed bone remain of a brownish hue, it will generally retain its vigour ; if, however, the colour is white, it will most probably be cast off. Necrosis may come on at various periods of life, but is most commonly met with in young subjects, in whom the inflammatory action is allowed to make progress before it is noticed or attended to. It may affect the external or the internal part of a bone, or nearly its whole thickness. The whole of a bone never dies in consequence of increased action, and it is very seldom that the entire thickness of any part of it is found to be necrosed. A large portion of it, or numerous small irregular portions, may die ; but still a part of the original shaft remains, and by its vessels reproduc-

tion is accomplished. The whole of the articulating extremity is also very rarely destroyed by this disease. Many writers have talked of death of a bone throughout its whole extent, and in fact the term necrosis was originally adopted on this supposition.

The progress of necrosis is, as has been said, similar to that of sphacelation. The affected bone gradually changes its colour, and loses its sensibility; a line of demarcation is formed, and ultimately the dead portion is completely detached from the living. Previous to its separation, the surrounding parts have commenced forming new osseous matter, which is secreted in nodules, and from continued deposition, soon becomes consolidated; the new bone next secretes a texture similar to itself, whereby the new deposit becomes extended, and not unfrequently affords an almost complete encasement to the dead portion or *sequestrum*. In general, bone dies irregularly, so that the sequestrum presents an uneven surface, and its margins are rough and serrated by numerous sharp projections. From this appearance of the dead bone, it was imagined that after its separation, portions of it were removed by absorption; and this opinion was strengthened by the thin exfoliations of the external lamina being found perforated at several points by minute apertures,—worm-eaten, as it was called. But a dead portion of bone, detached from the surrounding parts, is in every respect an extraneous body, and is not, and cannot be, acted on by the absorbents, any more than a piece of metal, glass, wood, or stone. Some have gone so far as to

affirm that portions of these are absorbed ; but this is altogether absurd. Lead bullets remain for years in the human body, and frequently vary their situation, yet they are afterwards found to be unchanged ; portions of glass become surrounded with a dense cyst, and often remain in the body for a long time ; I extracted a large splinter of wood from the orbit in which it had been imbedded for many months, and had not changed its appearance ; and numerous other examples of the non-absorption of foreign bodies might be produced, were it not that the opinion is now almost universally exploded. The separation of the dead part from the living is accomplished with greater or less ease, according to the bone which is affected, the state of the constitution, and the general health. In the bones of the superior extremity, this as well as every other action, proceeds more rapidly than in those of the inferior. It occurs in consequence of absorption of the osseous matter interposed betwixt the dead and living parts ; the sequestrum is not pushed off, as some have supposed, by granulations deposited on the living margin of the bone. During its progress, matter forms, makes its way to the surface, and is discharged through minute, and often numerous, apertures, which afterwards become fistulous. The soft parts are thickened and indurated, and the integuments are red, and sometimes of a livid colour.

Formation of matter is also occasionally the cause of necrosis ; for example,—I have seen several instances in which it occurred from neglected erysi-

pelas of the leg. The matter is in general thick and laudable; at first it is secreted in small quantity, but afterwards more profusely. The external openings, through which it is discharged, are found to lead to *cloacæ*, or apertures in the new bone which encases the old, and through these the dead portions can be discovered by the probe; and it will thus be ascertained whether the sequestrum is fixed or detached; when loose, it can often be moved upward and downward in the cavity. When the shaft of a bone is affected, the whole limb is much enlarged, by the inflammation having extended to a considerable distance above and below the necrosed portion. The unshapely appearance of the limb continues until the sequestra be discharged; for by their presence incited action is continued, and only subsides after their removal. Previously, however, great effusion of new bone has, in general, occurred; thus a preparation has been made for the strengthening of the limb, which, after a considerable portion of its thickness has been destroyed, would be incapable of supporting the weight of the body; and from this circumstance it can never completely regain its proper appearance. Its unnatural bulk is often much diminished, for the new bone gradually becomes consolidated and smooth on the surface by the action of the absorbents. Nature seems to construct her substitute after the model of the original, and in some instances but very little change can afterwards be observed in the limb.

In *external* necrosis, death of the outer lamella, reparation is chiefly made by the subjacent parts;

and this species of necrosis occurs most frequently in the flat bones. In necrosis involving a greater thickness of the bone, the new matter is also furnished by the subjacent parts, which, however, are materially assisted in the process by the extremities of the living bone, which form the margins of the deficiency. The bony matter is deposited with great activity, and frequently columns of the new deposit cross over the sequestrum, binding it firmly down, and rendering it almost immovable, although it is completely detached from the living parts.

It has already been stated, that those vessels which ramify *within the substance* of the Periosteum have no share in the reproduction of bone, but osseous matter is effused by the ramifications extending from the membrane to the bone; this effusion becomes organized, and greatly assists in forming the substitute.

In *internal* inflammation and necrosis, the symptoms are all of a more violent character; and the painful feelings, the discharge, and the thickening of the bone, continue, as long as the cancellated sequestrum remains.

It is remarkable how a limited, and, on after examination, an apparently trifling necrosis of the cancellated structure may produce the most violent local symptoms, induce severe symptomatic fever, endanger the life of the patient, and render removal of the limb absolutely necessary.

Occasionally abscesses form at a considerable distance from the necrosed part, and afterwards degene-

rate into sinuses, which communicate with the diseased bone, and are consequently long and tortuous, so that examination by the probe is rendered difficult: When necrosis is extensive, there is a risk of fracture occurring, if motion of the limb be permitted before a sufficient quantity of new matter has been effused; before nature has had sufficient time for the consolidation of her substitute, and consequently before the new bone has come to resemble the old in thickness and cohesion.

Violent inflammatory fever attends the incited action of the vessels of the bone and Periosteum, which precedes necrosis. But after the abscesses have given way, the painful symptoms subside, and the health seldom suffers to any great extent, the system becoming gradually accustomed, as it were, to the new condition of the parts. Hectic supervenes only when the disease is very extensive. Frequently fresh collections of matter form as each piece of bone approaches the surface. When the effusion of new bone has extended to the neighbourhood of a joint, its motion may be very much impeded, and from the limb being kept in a state of rest for the cure of the necrosis, ankylosis may occur.

*Treatment.*—The means of preventing death of bone, or severe inflammatory action, have been already alluded to—abstraction of blood, rest, purgatives, antimonials, &c. When necrosis has occurred, no interference with the bone is allowable, unless the sequestrum is loose, or unless the patient's health

is suffering severely under the discharge and irritation. When the sequestrum can be readily moved about, or when, projecting through the external opening, it can be laid hold of by the fingers or forceps, attempts must be made to remove it. The surgeon ought not, however, to allow it to approach the surface, and project externally, for the natural discharge of the sequestrum is a much more tedious process than the removal of it by art, and by the irritation produced during its spontaneous ejection, the inflammatory action is continued and may be aggravated; and long before it has appeared externally, it must have been completely separated from the living parts, and so admitted of ready extraction by the proper means. When it has been ascertained that the sequestrum is loose, it ought to be laid hold of by forceps, and moved freely upward and downward, so that any slight attachments by which it is connected to the neighbouring parts may be destroyed, whether these be minute filaments which still in some degree retain their vitality, or small portions of newly deposited bone, which are so situated as to prevent the free movement of the sequestrum. In general, no impediment of this nature exists, and the dead bone is easily removed. Before extraction can be accomplished, it is necessary to enlarge freely the external opening, in all cases where the dead portion of bone is of considerable size. If, on thus exposing the parts, the sequestrum be found detached, but still firmly bound down by the substitute bone, deposited over it either in one continuous sheet, or in irregular



columns, this must be divided by a trephine, a small saw, or cutting pliers, before the sequestrum can be extracted. When a dead portion of bone, of considerable length, is exposed at its centre, whilst its extremities are entangled by the old or substitute bone, the division of the exposed part, by means of the cutting pliers, will often be sufficient for the removal of the sequestrum, the cut ends being seized by the forceps, and one half removed after the other; and thus the perforation of the substitute will be rendered unnecessary. The instruments, and especially those for extraction, ought to be very powerful, for in the employment of inefficient means there is much folly and cruelty. Incisions into a necrosed limb are attended with profuse hæmorrhage from the incited vessels; and in some cases it is with difficulty arrested, in consequence of retraction of the cut ends of the vessels not taking place within the indurated and almost cartilaginous parts. When necrosis has been extensive, the limb must be carefully supported by the application of splints and bandage, till the process of reparation be completed, in order to prevent fracture of the recently formed substitute.

The treatment of necrosis may be summed up in a very few words. Prevent the necrosis, if possible—open abscesses whenever they appear; encourage the patient to move the neighbouring joints; support the strength; remove sequestra when loose—but do not interfere till they have been ascertained to be so; give the limb proper support and rest, when a large sequestrum is formed. When frac-

ture has taken place, when the health has been undermined, or when neighbouring joints have become diseased, amputate, in order to save the life, if it is impossible to save the limb.

It is almost superfluous to remark, that leeching and blistering are worse than useless after necrosis has occurred, however useful they may be in preventing it; and that the adoption of measures to promote the dissolution and absorption of the sequestra are glaringly absurd.

Necrosis, after amputation, was formerly frequent; but in the present improved state of this operation it is so rare as not to be entitled to separate consideration.

A peculiar matter is occasionally secreted by the blood-vessels of bones, more particularly of their extremities which form part of the articulation of a joint, and it has been termed PORCELLANOUS DEPOSIT. When this matter has been deposited, we find, on examining, that the cartilage on the extremity of the bone is in general of its healthy appearance, except at certain points where its situation is occupied by a smooth and dense substance; it is extremely hard, and its surface is of a polished appearance, resembling that of marble. In general the deposition is not extensive. Sometimes it would seem that the cartilage has been absorbed, and that the deficiency has been filled by effusion of the porcellanous matter; in other instances this seems to be deposited in a thin stratum external to the car-

tilage. Occasionally the deposit is not limited to the cartilage, but is also effused on the heads of the bones in its neighbourhood, by which the articulation is enlarged and disfigured, and the motion impaired. Thus, in the hip-joint, the peculiar matter is sometimes deposited in the situation of the ligamentum labri cartilagineum, to such an extent as completely to lock the head of the femur within the cavity of the acetabulum; so that, after maceration, the femur cannot be dislodged without fracture of the new matter. All articulations are liable to become affected with this deposit; the articulating surfaces of the scapula and clavicle are very often the seat of the disease. Porcellanous deposit often takes place during long confinement of a limb, as after severe injuries.

The only prominent symptom which attends the affection, is stiffness and grating in the motion of the joint; and from producing little inconvenience, its existence is seldom discovered during the life of the patient. It occurs in people considerably advanced in life, and often seems to follow gouty or rheumatic affections. I am not aware that any means can remove the disease, and, from its nature, its being incurable is of but little importance to the patient, and little regret to the surgeon.

### *Fragilitas Ossium*

OCCURS chiefly in old people, in whom the bones consist of an undue proportion of earthy matter, and

are endowed with little vascularity, though full of an oleaginous fluid.

The bones, when in this condition, often break from the slightest force applied; as from the action of the muscles whilst the patient turns himself in bed, or whilst walking across the room, or when endeavouring to attain the erect posture whilst seated on a chair. After fracture, the process of reunion is extremely slow, and it never occurs in patients very old and of worn-out constitution. With a view to prevent the occurrence of fracture when the bones are in this condition—for it is evidently impossible by any treatment to prevent this change in the texture of the bones—the only rational indications seem to be, to keep the patient on a generous diet, and to prohibit him from making any great muscular exertion—to avoid, in fact, all circumstances likely to produce a sudden action of any particular set of muscles. It is to be considered as a symptom of a decayed and exhausted system rather than a disease.

### *Of Mollities Ossium, Rachitis, &c.*

THESE affections differ only in this, that in the latter, the earthy matter is not deposited originally, whilst in the former, it is absorbed after having been deposited; in both, the symptoms and consequences are the same. The latter is peculiar to the very young, the former to those of an advanced age.

*Softening of the bones* is met with at all ages, and in different degrees. It often follows dentition, measles, hooping-cough, or other infantile diseases inducing general debility. In females, it seems to be produced by the debilitating effects of leucorrhœa, miscarriages, floodings, &c. Loss of blood, in any way, predisposes to it. Mercury, given in immoderate quantities, produces a softening of the bones; and, in some most remarkable instances on record, the free use of common salt was the only cause assigned. When the disease affects children, all the bones generally suffer, those of the extremities as well as those of the trunk; the limbs become bent in an extraordinary manner, and the heads of the bones are swollen, and appear to be much more so in consequence of the wasted and flabby state of the muscles. The child walks with difficulty, and in many cases the legs are utterly incapable of supporting the weight of the body, so that he cannot remain in the erect position. The chest and pelvis become deformed, breathing is oppressed, the digestive organs are deranged, and the belly is tumid. The bones of the limbs become flattened as well as bent, and in their concavities new bone is effused, in order that the column of support may be thereby strengthened; the new deposit is of extremely dense consistence, and is effused in greater or less quantity, according to the degree of curvature. The bones are soft, cellular, and of a brown colour, contain a dark fluid, and are very deficient in earthy matter. As a simple proof of the latter circumstance, it may be mentioned, that distortions of the pelvis

can be accurately imitated by the bones being soaked for some time in acid, whereby the earthy matter is extracted. In many instances, this component of the bones is almost entirely removed, they consisting merely of an extremely thin external osseous shell, covered by thickened periosteum, and containing a pulpy substance resembling fatty matter. During the progress of the disease, the urine deposits, often in great quantity, a white sediment, which, on analysis, is found to be the phosphate of lime. In rickets, the head is generally enlarged to a greater or less degree, and the bones of the cranium are thickened and spongy; not unfrequently the intellectual faculties remain acute. In adolescents and adults, the limbs seldom become affected, and the bones composing the spinal column are the seat of the disease, and, along with the distortion of the spine, the position of the ribs is necessarily altered. Certain rare cases have occurred, in which all the bones of the adult were softened to a very great degree. In one remarkable instance, the patient complained of an annoying sense of tightness in the limb most affected, and, on examination, the softened bone was found greatly depressed at that point, as if a strong ligature had been drawn tightly round it.

Though incurvation of the spine occurs in boys, and even in adults, still it is most frequently met with in young females; and in them, it is often induced by their having assumed a bad habit of sitting long in one constrained and awkward posture, as in writing or drawing, without, perhaps, the bones

being unnaturally soft in the first instance. It often follows affections of the lower limbs, as of the knee or hip-joint; and is also caused by shortening of a limb, which has been negligently or ineffectually treated after fracture during childhood, or by the patient being allowed to continue a custom of standing awkwardly on one leg. At first, during slight curvature from such causes, the spine can be brought into its original straight position by the voluntary action of its muscles. After some time, however, the curve cannot be remedied by any effort, interstitial absorption occurs in the bones, and they become changed in form, and the muscles accommodate themselves to the new position, as also do the various ligaments connected with the spinal column. When the curvature is seated in the dorsal vertebræ, it is generally to the right side, the shoulder is raised, and the chest is protruded, whilst the opposite side is depressed and flattened. The clothes hang loose, or fall off on the left side—the patient rests the weight of his body chiefly on the left leg—on stooping, the right scapula projects, and, on examination, is found to be nearer to the spinous processes of the vertebræ than the left. The left cavity of the chest is diminished, and the ribs press upon the heart and lungs, causing difficulty of breathing. To preserve the balance of the body, a curvature occurs below the former, and in the opposite direction; and not unfrequently there is a third incurvation situated above the primary one.

The bones of the pelvis become distorted, and are

twisted to one side; or, when the softening is great, and the patient confined to the recumbent position, the introitus of the cavity becomes diminished in the antero-posterior diameter; and if the patient walk about, the ossa pubis are squeezed together, in consequence of the pressure of the ossa femora against the acetabula. The crests of the ilia are often bent inwards, in consequence of the pressure of steel apparatus, injudiciously applied with the view of removing deformity. When the bones become consolidated after such distortion, they present most serious obstacles to parturition; and, most unfortunately, the fact of crooked and deformed women possessing "great aptitude for conception" is notorious. When, in such females, the untoward circumstance of pregnancy has occurred, it has been necessary, in some, to have recourse to the Cæsarean operation, and others have been delivered with the greatest difficulty and danger; notwithstanding which, these latter have, after recovering from a long and tedious illness, again become pregnant.

In some cases, the softened ribs not only compress the organs of the chest, but are also pressed down upon the abdominal viscera, or even into the pelvis. The symptoms arising from such displacement are at first urgent, as can readily be imagined, and are often treated as inflammatory, to the detriment of the patient.

After some time, as the state of the patient's health improves, the bones in some degree regain their original firmness, and the curvatures are rendered



permanent. New bone is deposited in the concavity of the curve, at first in irregular masses, but afterwards becoming condensed, and assuming a more regular form, the column is supported and strengthened.

Bending of the spine backward, with depression of the spinous processes, is extremely rare. But curvature forward, with projection of the spinous processes, is by no means uncommon, and is generally supposed to be caused by caries of the bodies of the vertebræ; in many instances, however, it arises from interstitial absorption. Curvature from caries of the vertebræ seldom happens; and though it certainly does occur in children, still it is by no means so frequent in them as in adults. It is attended with the formation of purulent matter, which points in the loins, at the top of the thigh, or near the anus; and the bones may become affected secondarily in consequence of the formation and accumulation of purulent matter in their neighbourhood. There is pain in the loins, the patient walks in a stooping posture, and often complains of pain in the knee or thigh. The lower limbs become paralytic, as also the sphincters and extremities of the hollow viscera; this, however, may arise, without curvature, from softening of, or effusion on, the chord, or diseased thickening of its membranes. In palsy from injury of the spine, there is more or less excitement of the urinary and genital organs, depositions in the bladder, priapism, &c. In some cases the palsy supervenes slowly; at first the patient has an awkward gait, he lifts his feet high to avoid

stumbling, and afterwards puts them down clumsily and suddenly ; the foot, in some cases, is extended, so that the patient is unable to plant the sole on the ground. Retention of urine occurs, and is followed by incontinence.

In the *treatment* of Rachitis, the chief indication to be fulfilled is to support and increase the powers of the system; and this may be accomplished by affording the patient a generous diet, keeping the bowels in good order, enjoining gentle exercise and exposure to pure air, by the use of frictions, and by supporting the softened bones by properly applied and light machinery. Much mischief may be done by clumsy and heavy apparatus which confine the movements of the patient ; the muscles are wasted, consequently the spinal column is weakened, the general health is impaired, and the disease is aggravated. Some have recommended the internal administration of the phosphate and muriate of lime, but their efficacy is extremely doubtful. In cases of curved spine, apparently arising from bad habit, the patient should be in no degree confined at writing or drawing ; his posture while at work or play ought to be attended to, as well as his mode of walking and standing ; and, if awkward, prohibited. Gymnastic exercises of the more gentle kinds ought to be enjoined. Carrying weights on the head can only be applicable in certain cases. The shoulders ought to be kept back by means of a light back-board. Sea-bathing, good air, out-of-door exercise, and attention to diet, are of material importance. Frequently advantage will result from

the patient's sleeping on a hard mattress ; and, in bad cases, from lying down, when tired, on an inclined plane.

In great softening, it will be necessary to confine the patient to the recumbent position, and to support the head and shoulders by a light and firm machine. The symptoms, appearances, and treatment of caries of the spine, with or without curvature, will be afterwards considered.

### *Of Inflammation, and other Affections of the Arterial System.*

DURING inflammation of arteries, the actions of the vessels are accelerated and attended with pain ; the internal coat is found to be of a red colour, from increase of its vascularity, and not from being merely tinged with the colouring part of the blood, or it is of a yellowish hue from the deposition of lymph on its surface, whilst the external coat is thickened by the infiltration of serum and lymph. When blood-vessels are inflamed from mechanical irritation, lymph is secreted on their internal coat, becomes organized, and obliterates their calibre ; if deficient in nervous influence and circulating fluid at a particular point, there ulceration of their coats occurs ; if violently injured or completely isolated, their coats mortify ; and these circumstances must all be calculated on in the surgical treatment. A universal inflammatory state of the arterial coats is said to have existed, and

its symptoms have been minutely detailed; but its occurrence seems to be extremely rare, and the treatment is *medical*.

Inflammation is supposed to precede degeneration of the arterial coats. As a person advances in life, the arteries lose elasticity, and the heart its balance with them; either the one or the other becomes dilated, their parietes are thickened, and the valves are altered in structure; the enlargement of the vessels is generally greatest towards their origin. The dilatation of arteries, more especially of the internal ones, is often very great; ultimately the internal coat gives way, and the external, with the surrounding tissues, yields in proportion as the blood diffuses itself.

Previously to the rupture of the internal tunic, there is, in most cases, a morbid alteration in the texture of the vessel. The internal coat becomes dry; its texture is more dense and less elastic, and, consequently, more brittle. Morbid matter is deposited between the middle and internal coats, and this, by stretching the latter still further, diminishes the elasticity and cohesion of their texture. The deposit is at first to a slight extent and of soft consistence, somewhat resembling condensed fatty matter, and hence termed *Steatomatous*. Afterwards, it increases in quantity and consistence, becoming, instead of soft and yielding, dense, hard, and incompressible, in short, calcareous.

Though the morbid deposit is at first confined, as above related, its limits are afterwards extended;

calcareous matter is insinuated, either in minute particles or in broad laminæ, amongst the fibres of the muscular tunic, is also found external to it, and occasionally situated in the cellular coat. In fine, the various component parts of the parietes of the vessel degenerate, according to the degree of advancement which the disease has attained ; and such a condition of the tunic is the predisposing cause to ulceration of the internal coat, and subsequent effusion of blood.

During violent and sudden exertions, the more brittle parts may burst, either at a certain point, or throughout the whole circumference of the artery ; and on this such results will supervene as on ulceration of the internal tunic.

Ecchymosis takes place under the cellular coat, which becomes thickened, and incorporated with, and strengthened by, the surrounding tissues ; this is the incipient state of an ANEURISMAL *tumour*. The effusion of blood, gradually increasing, distends the cellular coat forming the cavity into which it is poured, and produces a tumour of a size proportional to the distensibility of the tunic and the force of the effusion. An aneurism, however, may exist from simple dilatation of a portion of the vessel, gradually increasing, and forming a cavity in which the blood accumulates. At one time it was supposed that all spontaneous aneurisms were caused by simple dilatation of the canal, but such an opinion has been long shown to be incorrect, and the term of *true* aneurism is now confined to that tumour and accumulation of

blood consequent on the giving way of the internal coat, and situated externally to the canal of the artery. It is true, that dilatation may occur previously to the giving way of the coats, and thus the two causes are combined, but the former is one of little efficacy and importance when compared with the latter. The dilatation occurs from the calibre of the artery being considerably constricted at the point where its coats have undergone the calcareous degeneration, and only acts as a predisposing cause to the failure of the coats when thus diseased. When there is mere dilatation, the tumour is generally of an oval form, but when the internal coat gives way, a lateral prominence is formed, and gradually increases in size. The shape of the true aneurism is various; sometimes the tumour is globular, with a narrow neck, and from the neck being of considerable length, it becomes difficult to ascertain the particular artery which is the seat of disease, the globular extremity of the tumour presenting itself at a distance from the vessel with which its pedicle is connected; at other times its form is very irregular, being most prominent at the part where the accumulation of the blood is least resisted. Pulsation in the tumour is distinct from the first, and is painful to the patient; and in the external aneurisms, it is so strong as to be perceived by a bystander at a considerable distance. The tumour is at first compressible, and completely disappears on pressure being applied, either directly to the sac, or to the artery above, the sac being thereby emptied of its contents. It may be difficult to form an accurate diagnosis, from the cir-

cumstance that tumours not aneurismal receive a pulsatory movement from an artery or from arteries immediately beneath them ; such difficulty is obviated by attention to this simple test—that in an aneurism the pulsation is felt *equally in all directions*. Besides, if the tumour is movable, it can be partially displaced, so as not to lie immediately over a large artery, and if it is not aneurismal, it will be found to possess no pulsation ; if it is an aneurism, its pulsation will not be diminished by any change of position.

The blood contained within the aneurismal sac being comparatively motionless, coagulates, and the coagulum is attached to the inner surface ; at first it contains red globules, and is of a red colour, but it afterwards loses the globules, and becomes of a pale hue, consisting solely of fibrine. This coating gradually increases, and attains no small thickness, fresh portions of fibrine being superadded in concentric laminae. These laminae are chiefly deposited from the blood within the cavity, but they also receive addition from lymph being effused by the vessels proper to the original parietes of the tumour. By such thickening, it can be easily conceived that the pulsation will be somewhat lessened. It is not, however, diminished to any great extent, for absorption of one or more points occurs, and the coating is again attenuated.

In some rare cases the deposition of fibrine has gone on gradually accumulating, filled completely the aneurismal cavity, restored the course of the blood to its former channel, and thus effected a spontaneous cure, the remaining solid tumour imperceptibly diminishing

by the action of the absorbents. Or, after obliteration of the aneurismal cavity, the fibrine may be deposited in so great quantity as to occupy the calibre of the vessel above and below the tumour, obstructing the progress of its blood, causing it to flow by the collateral smaller branches, and effecting a spontaneous cure, somewhat similar to that produced by the artificial application of a ligature. Coagula are not formed in the dilated vessel, to whatever size it may be enlarged, unless there is a fissure of the internal coat, for in no other way can a portion of the blood become stagnant, while the calibre of the vessel remains pervious.

A spontaneous cure may also be accomplished from the original aneurism being compressed by one of a more recent origin, causing ultimate obliteration of the canal. Of this I recollect one remarkable instance; the patient was afflicted with an aneurism of the subclavian artery, which had attained a large size, and the cure for the disease in this situation being then unknown, the patient was considered as lost; but some time after the tumour began to diminish, and disappeared. The patient died; and the cause of death was found to be the giving way of an aneurismal tumour of the arteria anouyma<sup>l<sup>a</sup></sup>, which was situated so closely to the aneurism of the subclavian as to have acted as a mechanical compress, causing obliteration of the vessel at that point.

When a cure has been effected, the vessel is found to be converted into a dense and impervious chord at the site of the tumour. The canal above is dilated,



the coats are thickened, especially the middle, and from the thickening and increased action of the muscular fibres, the internal coat becomes somewhat rugous, the rugæ being in a transverse direction.

The aneurismal tumour in general increases, and approaches the surface, involving and destroying all the intervening textures. If resisted in its enlargement by bone, even this is not sufficient to impede its progress, but becomes absorbed and perhaps ulcerated at the point where it is compressed by the tumour. The osseous is more liable to destruction from this cause than the cartilaginous tissue, contrary to what occurs from compression by abscess. Ultimately the sac gives way, and its contents are discharged either externally, or into an internal cavity or canal, in consequence of its parietes sloughing from the compression made by the tumour; and such termination is fatal. The disease may also prove fatal by mere compression of the trachea, impeding breathing, and inducing disease of the respiratory organs; or by pressure on the gullet preventing the passage of food: in the latter case, however, the dissolution is generally more sudden, in consequence of the compressing part of the tumour giving way, and the contents being evacuated into the stomach or mouth.

If the aneurism compress a plexus of nerves, or the spinal chord itself, the anterior part of the vertebræ having been previously absorbed, paralysis is produced. In consequence of aneurism, the circulation of blood in the vessel is obstructed; hence the collateral branches above the tumour become enlarged, and through them

the circulation is continued; as by their anastomosis with collateral branches which arise below the seat of the tumour, a portion of the fluid is brought back into the canal of the original artery. The circumstance of collateral enlargement was distinctly shown in amputation, one of the old cures for the disease.

The tumour may be suddenly increased by a portion of the parietes giving way, and the blood being propelled into the cellular tissue, which becomes thereby condensed, and supplies the deficiency in the original sac. The disease is generally accompanied with great pain, the neighbouring nerves being much stretched by the enlargement of the tumour, as in the axilla or ham; in these situations also the limb below the aneurism is much swollen from the compression of the absorbents and veins. Diffused aneurism from wounds, and the other species of the disease, will be afterwards treated of.

The peculiar degeneration of the coats of the vessels has been already stated to be the predisposing cause of aneurism; and the disease may be directly caused by over-excitement of the circulation, or by an over-exertion of the muscles. It is more frequent in males than females. In men somewhat advanced in life the arteries get hard and rigid, whilst at the same time the muscles are strong, the general health good, and the whole frame stout and active; so that the patient is capable of severe muscular action, such as the arteries are ill able to bear, and consequently the internal coat of a vessel yields, and lays the foundation for an aneurism. The lower limbs being chiefly

subject to such exertions, aneurism in them is most frequent; and for the same reason it is said to be common in those who ride much on horseback. Degeneration of the coats of the vessels in the superior extremity is extremely rare. This is another reason why spontaneous aneurism seldom assails them.

*Treatment.*—In internal aneurism the only indication which can be followed, with any chance of success, is to favour the occurrence of a spontaneous cure, by abstracting all stimuli, mental and corporeal, by enjoining complete rest, by keeping the patient on low diet, and by repeated bleeding. Thus the force of the circulation is diminished, and coagulation promoted; by this practice aneurisms, the progress of which defies external means, are occasionally cured. Ice and other cold applications to external aneurisms, or those which have made their way to the surface, have been recommended to induce coagulation, but their use is not unattended with danger; for they may so far diminish the vitality as to cause sloughing, and fatal hæmorrhage.

In the treatment of aneurisms exterior to the great cavities, important improvements have been made in modern times. No success can be expected to follow palliative and temporizing measures, and a cure can result only from operation. Formerly it was the practice to lay open the aneurismal tumour, and to search for the extremities of the artery opening into the cavity, and to secure them by ligature, or close them by pressure, styptics, or both. In some few instances this had permanent success;

but in the majority the operation proved wholly abortive, and not unfrequently fatal. It was necessarily tedious in its performance, and attended with much danger, the blood being discharged in great profusion immediately after the opening of the sac, and the extremities of the vessels being with great difficulty detected and secured. Besides, the vessels in the immediate neighbourhood of the tumour have undergone the degeneration already mentioned, have become incapable of taking on any healthy action, and consequently the application of ligature on a vessel thus circumstanced could be productive of no advantage. From this method having almost invariably proved unsuccessful, practitioners in those days generally preferred amputation, when the tumour was so situated as to allow it; and when the disease occupied a situation in the limb so high as to prevent amputation, the case was deemed incurable, and the patient abandoned to his fate. But amputation was accompanied with circumstances almost equally alarming with those attendant on division of the sac: the hæmorrhage was very great, for in consequence of obstruction to the free passage of the blood in the aneurismal vessel, the circulation was chiefly carried on by the collateral anastomosing branches, which were thereby so much enlarged, as, on their division, to pour out blood with a profusion resembling that of arteries of the second or third magnitude. Continued pressure was employed, but was equally inefficacious; and was also attended with danger, from the risk of sloughing. If the practice ever proved

successful, it was only after a tedious perseverance in its use, and long confinement of the patient.

The operation of applying a ligature on the vessel at a distance from the tumour, and thus intercepting or weakening the flow of blood into the cavity, so as to allow complete coagulation to take place, is of comparatively modern invention, and is the one now practised with almost invariable success. This operation has been variously modified. Some have employed the temporary application of the ligature, conceiving that the effects produced will be as complete and permanent when it has been only allowed to remain for a certain time, as when it is left undisturbed and ultimately separated by nature. Such a theory, however, has proved to be incorrect in most of the instances in which it has been reduced to practice in the human subject; and the operation is at best very uncertain, and not to be relied on. Others have employed a double ligature, and those of the continental surgeons are numerous; some are tightened, others are left loose. A thick broad ligature like tape has also been used, from an ill-grounded apprehension, that the coats of the artery would be cut through by the tight application of a thin and firm one. Such complications can do no good, and may do much mischief. The artery must be greatly detached from its surrounding connexions before the ligatures can be applied, in consequence of which, its coats will slough, and hæmorrhage occur. When, from any cause, the vessel has been detached to a greater extent than is sufficient for the passing of

one ligature, two ought undoubtedly to be passed, and one applied to each extremity which remains attached to the surrounding parts.

Again, it has been proposed, after the application of a double ligature, that the vessel should be cut through betwixt the two deligated points; it being supposed that in this way the closure of each extremity will be more rapid, the cut ends retracting, and being, in fact, in the same circumstances as the extremities of arteries which have been tied on the face of a stump. Mechanical contrivances have also been invented for assisting in the compression of the artery,—such as the *serrenæud*, *presse artère*, &c.; these, however, are clumsy, insufficient, and often injurious.

The single ligature, when properly applied, is much preferable to all others, and stands in need of no auxiliary means. In its application, the artery must not be separated from its connexions farther than is barely sufficient for the passage of the armed needle beneath it; but the external incision ought to be free, in order that the operation may be easily and speedily performed. By the firm application of a single ligature, the vessel is rendered impervious; and the internal and middle coats are lacerated, so that the ligature only encircles the outer or cellular coat, which resists the influence of any force by which it may be tightened. The blood coagulates above the deligated point,—the coagulum is of greater or less extent, in proportion to the vicinity of a collateral branch, and is always of a conical form, the calibre of

the artery being contracted towards the constriction. Inflammation is excited in the vessel, the lacerated margins of the internal and middle coats secrete lymph, by which they adhere, and so obliterate the canal of the artery at that point. Lymph is also effused on the external surface, and in this deposit the ligature becomes imbedded. The direct influx of blood into the aneurismal sac is thus intercepted, and time is allowed for coagulation of the blood which it contains; and the artery for a considerable distance below the ligature becomes converted into a firm and impervious chord. The coats of the vessel above the ligature are much thickened, and the internal membrane is occupied with the transverse rugæ occasioned by projecting fasciculi of muscular fibres, which are always apparent after obstruction of an artery. If this operation be properly conducted, success must almost uniformly follow. Before determining on its performance, however, the state of the arterial system ought to be examined as carefully as possible; for not unfrequently the degeneration of the coats is almost universal, and therefore an artery, or even arteries, may be diseased at more points than one; and if this aneurismal diathesis exist, the patient may be found to labour under an internal aneurism of the aorta. In such a case, success from any operation, for the cure of the external aneurism, can never be expected; and there is also no inconsiderable danger of the patient's death being suddenly accelerated by the operation, the sac of the internal aneurism giving way during

its performance ; such circumstances have actually occurred.

Ligatures composed of animal substance, such as catgut, have been proposed as preferable to all others, on the supposition that they would be absorbed, and occasion less irritation ; the fallacy of any such theory has already been adverted to. After the ligature has been applied for some time, it induces ulceration of the external coat which it envelopes, by which means it becomes detached from the vessel, and acting as a foreign body, and causing a slight degree of suppuration, is brought by nature to the surface and discharged. The period at which it separates may be said to be from the tenth to the twentieth day ; sometimes sooner, seldom later. If, however, much of the surrounding parts has been included along with the vessel, a longer period will elapse before the separation of the ligature. One end only of the ligature should be cut away close to the artery, the other being left protruding through the external wound ; as thus the extraneous body, when detached, can be readily pulled away. When both ends are cut short, there is a risk of secondary hæmorrhage, from the ligature causing formation of matter round the vessel, and ulceration of its coats.

The operation ought to be performed at as early a period of the disease as possible. Some recommend that it should be delayed in recent cases, with the view of allowing sufficient time for the anastomosing vessels to enlarge, supposing that the circulation of the blood will thus be more vigorous in the smaller



branches after obstruction of the principal vessels. Such delay prolongs the patient's sufferings, which are in many cases extremely acute, and the precaution is altogether unnecessary, as has been amply proved by experience. On the same principle, the previous application of pressure to the vessel has been recommended, but few surgeons, if any, are now afraid of trusting to the resources of Nature when the principal vessel of a limb is obliterated, and that suddenly, without previous dilatation of the anastomosis. Cases are on record, in which the abdominal aorta has been completely obstructed without much impeding the inferior circulation; and in one remarkable instance of this description, the inconvenience was so slight, that the disease was not suspected during the life of the patient, the lower limbs retaining their usual size and activity. In the plethoric, it may sometimes be prudent to abstract blood previously to the operation. When the ligature is placed immediately below a collateral branch of considerable size, a bloody coagulum is not formed, though adhesion may occur; but if the inflammatory action extend to the collateral branch, and its canal become thereby obliterated, a coagulum is speedily deposited. In consequence of the enlargement of the anastomosing branches, and the increasing circulation in them, pulsation generally returns in the tumour, to a slight degree, some days after the operation. This, however, is by no means a sign that the operation has been ineffectual; for the renewed pulsation almost always disappears in the course of a very short time. In one instance

only have I found it assume a more permanent and troublesome aspect ; in that case, it recurred about ten months after the performance of the operation, but speedily disappeared under the careful use of a bandage. On account of the aneurismal diathesis, it occasionally happens, that after the cure of one aneurism, another appears in a different situation ; in two instances, I operated on both thighs, successively and successfully, for popliteal aneurism, in the same patient. When the tumour is so situated as not to admit of the application of a ligature between it and the heart, it has been the practice to place the ligature on the distal side of the aneurism, upon the supposition that coagulation will occur within the sac in this case as after the common operation. The practice has been made trial of, and its expediency and success appear very doubtful ; the *post mortem* examinations have as yet been very unsatisfactory. The application, indeed, of a ligature in that situation can seldom be of any advantage, the artery being already obliterated a long way beneath the tumour ; and it is perhaps from this circumstance, that, in such operations, great difficulty has been experienced in securing the vessel, and that surgeons have been obliged to pass their needle under a thick mass, somewhat in the situation of the artery. It would appear, in some instances, that the artery had even remained *intact*.

The appearance of the vessel after the application of a ligature above the tumour has been already shown. The obliteration of the sac proceeds, in some cases, very rapidly ; it assumes a harder feel, decreases,

and disappears; being connected with the vessel by means of a dense impervious chord, to which condition that portion of the artery has been reduced. The anastomosing vessels enlarge more and more, carry blood freely from above to below the ligature, and thence to below the tumour; some passing to the latter situation directly from above the ligature. Along with the muscular and other branches, the neurilemal vessels also become enlarged, and compress the nervous filaments; and to this are to be attributed the annoying pains which occur in a limb after the operation for aneurism. The enlargement of the neurilemal arteries can be distinctly shown by dissection.

Immediately after the operation, the circulation in the limb cannot be so vigorous as before; its temperature is consequently diminished, and it possesses less power of resisting the influence of stimuli. The limb ought to be kept moderately warm, for if too much heat be applied, there is risk of gangrene. Afterwards the temperature rises, and soon becomes above the natural standard, the blood, from obstruction in the internal parts, being chiefly determined to the surface. After the collateral circulation has been completely established, the limb regains its temperature.

Secondary hæmorrhage is occasionally a consequence of this operation; nor is it to be wondered at, after even one ligature badly applied, and far less after two or more, however dexterously. If, however, the operation by single ligature be properly performed,

and the coats of the artery be sound at the deligated point, the occurrence of secondary hæmorrhage must be rare. It generally supervenes when the ligature is about to separate; at first there is a thin bloody discharge, and afterwards the quantity of blood is more copious, evacuated at first in a gentle and continued stream, but afterwards *per saltum*, and in profusion. The discharge not unfrequently stops for a short time, but, on the circulation being excited, it again returns, and the patient soon dies, unless active measures be practicable, and immediately resorted to. Compression can be of no use, nor can venesection. The application of a ligature betwixt the heart and the open point of the vessel affords the only chance of saving the patient; the surgeon must interfere, and do what is in his power—he cannot look on and see the patient bleed to death.

Occasionally the aneurismal sac deviates from its usual structure and appearance. Sometimes osseous or calcareous matter is found deposited, to a greater or less extent, in the substance of the parietes of the sac, or between the laminae of fibrine which it contains. The tumour may also occupy unexpected situations, occurring after fracture of the bones and laceration of an artery, and perhaps from more slight external injuries. A disease of bone, somewhat resembling an aneurismal state of that tissue, will be afterwards considered.

*Of Aneurism by Anastomosis.*

THIS disease is generally seated in the external cellular tissue. It has been supposed to attack occasionally the internal organs; and a case is related, in which it was situate in the cellular tissue, between the vagina and rectum. Frequently the congenital marks of children, termed *Nævi*, seem to degenerate into this disease: occasionally it occurs in sound skin and in adults. The colour of the tumour is a dark red, or inclining to purple; it is irregular on its surface, and has a soft spongy feel. Often it is raised distinctly above the surrounding parts; at other times it is flat, scarcely prominent, and seems to enlarge chiefly in a lateral direction. Pulsation, in some instances, is felt; often, however, the tumour is of an inactive character, affords no feeling of pulsation, and, on being handled, feels like a doughy elastic intumescence, appearing to be composed of a congeries of distended vessels, resembling varix, in which the blood circulates slowly. The tumour is formed by enlargement, tortuosity, and increased activity of the neighbouring vessels; in some cases the arteries are chiefly affected, in others the veins. That such is its structure, can be distinctly proved by dissection—the vessels are found enlarged to many times their natural size, and their coats are much attenuated; it is not of a cellular structure, as some have supposed. Its tissue is similar to that of the corpora

cavernosa penis, and glans penis, which has hence been called the erectile tissue. It is much increased on the general circulation being hurried, as by crying in children, by fits of passion, by the excitement of ardent liquors or venery, and during or before the menstrual discharge. On such occasions the surface frequently gives way, hæmorrhage ensues, and is often profuse; and in females it may seem to take the place of the regular discharges. The tumour, in general, increases rapidly in size, and bleeds from time to time; sometimes, however, it becomes stationary, even in circumstances where it could hardly be expected, and remains so during the remainder of the patient's life. Again, in children, the surface of the tumour is not unfrequently ulcerated, even to a great extent, without hæmorrhage occurring; when such is the case, the ulceration for the most part extends, with surrounding induration and condensation of the parts; the whole of the adventitious tissue is thereby destroyed, granulations of a healthy character are formed, the parts cicatrize, and a spontaneous cure is accomplished. In other cases, though the structure scarcely seems diseased, there may be frequent and most violent hæmorrhage. A hæmorrhagic tendency also occasionally occurs in affections of a different nature, a trifling sore pouring out blood on the slightest touch. In some constitutions, leech-bites, pricks with pins, extraction of a tooth, &c. are attended with a dangerous hæmorrhage. The cause, or causes, of aneurism by anastomosis are unknown.

In very slight cases, or in nævus threatening to

assume an aneurismal action, cold and pressure are sometimes sufficient for the removal of the tumour. The most effectual remedy is excision, though it cannot be had recourse to in all instances; for when the tumour is extensive, and possessed of a hæmorrhagic disposition, the vessels in its neighbourhood are much enlarged and increased in action, so that any attempt to remove the tumour by the knife is followed by profuse, and often an uncontrollable flow of blood. When excision is practicable, it ought to be performed remote from the disease; for the tumour is to be cut out, not cut into. If the incisions be made in the substance of the tumour, or in the immediate neighbourhood of the diseased part, the tremendous bleeding which invariably ensues, will convince the practitioner of the impropriety of his conduct. Attempts have been made to arrest the progress of the diseased action, by tying the principal arterial trunks entering the tumour; but these have proved ineffectual, as might be expected, considering the unusually free and numerous inosculation which then exist. In a few instances, ligature of the carotid artery, on the same side with the tumour on the face or head, has put a stop to the disease; in the others, it has been unavailing.

When the tumour is so situated, or of such a size, as to render the expediency of excision doubtful, it may often be safely and expeditiously removed by ligature. In some cases the tumour is prominent, so that it readily allows of the application of a ligature around its base; in others, it is flat and broad; in

which case, a long needle, or needles, armed with a double ligature, can be passed beneath its base, and the ligature can then be separated, and so applied as to cause sufficient constriction of its whole base. The disease, however, occasionally occupies such situations as are totally beyond the reach of mechanical means. The application of potass has been recommended, and is certainly sufficiently powerful to destroy, and occasion the removal of, the diseased parts; but its use is attended with great danger of profuse hæmorrhage.

### *Of Inflammation of Veins.*

VEINS are very susceptible of inflammation, and in them the action is apt to extend rapidly; in some cases it reaches the right side of the heart, producing most violent symptoms, and speedy dissolution.

Inflammation in the venous, as in the other tissues; may terminate in resolution. Otherwise, lymph is secreted, whereby the coats of the vessel become thickened, and its internal surface is agglutinated, causing obliteration of the canal to a greater or less extent. Suppuration also occurs, and the pus may be deposited in a cyst formed amongst the coats of the vessel; or, as is most frequently the case, it is secreted from the internal coat, and effused into the cavity of the vein. It then generally accumulates, its passage into the circulation being prevented by a deposition of lymph sufficient to occupy the calibre of the vessel



above the seat of the purulent matter. This termination is accompanied with a high degree of constitutional irritation, and typhoid symptoms.

The integuments in the course of the inflamed vessel or vessels are of a dark red colour, and severe pain is caused by pressure. Often there is great œdematous swelling of the limb, occasionally followed by the formation of unhealthy pus, diffused in the cellular membrane, causing sloughing of that tissue, or of the soft parts more deeply seated.

This disease generally follows a wound, as in venesection, amputation, or accidents : it is also of frequent occurrence after the application of a ligature to the extremity of a vein after amputation. Many patients have died of this disease, induced by the application of a ligature to the vena saphena major, for the cure of varix. Wounding of large veins ought to be studiously avoided, and if wounded, the bleeding ought to be, if possible, arrested by pressure : a ligature should never be applied to a vein, unless as a last resource.

The disease is a very unmanageable one ; the exhibition of purgatives and antimonials will be prudent, in order to evacuate the bowels, produce diaphoresis, and diminish the force of the circulation ; the pain will also be much relieved by the application of warm fomentations to the affected part. General depletion is not admissible unless at the very commencement of the disease, and local bleeding must be had recourse to with very great caution ; for by copious abstraction of blood, gangrene may be induced, or at least has-

tened. The limb must be altogether disused, and the patient kept in a state of complete rest, and not exposed to any excitement or anxiety. Blisters have been employed, but with no good effect. If the vein is much distended, and it is evident it contains a confined accumulation of pus, it ought to be treated as a common abscess, the matter evacuated by an incision, and various dressings employed, according to circumstances. Such has been my practice. I have found it successful, and not followed by any untoward symptoms. The abscess is limited at each extremity by the deposition of lymph in the canal of the vessel, and after the evacuation of its contents, the cavity contracts, throws out granulations, cicatrizes, and renders the portion of the vessel which has been the seat of suppuration completely impervious; it is, in fact, altogether obliterated.

Inflammation of a vein is occasionally followed by the sudden appearance of a purulent depôt in some part of the body, external or internal, at a distance from the inflamed part. Thus, in inflammation of a vein in the fore-arm, it is not unusual to find an abscess formed suddenly in the axilla on the opposite side; and when a vein of the leg has become inflamed, after amputation, the patient is often suddenly affected with violent symptoms of disease in the chest, and, on examination, an abscess will probably be discovered in the substance of the lungs, the existence of which had been indicated only during a short time previous to death. The theory of absorption and subsequent deposition of the purulent

matter, by which these phenomena are explained, has not been as yet sufficiently authenticated by such facts as warrant its confident assertion.

Veins frequently become *dilated* or *varicose*; they assume a tortuous course, appear much enlarged, and present an elastic soft feel, except in the situation of the valves, where they are more hard and incompressible: occasionally the tortuous windings form a bluish tumour, of considerable size, partaking of the same character as one of its component trunks. The dilatation is increased by heat. The limb is swollen and œdematous. When a dilated vein is inflamed, the pain is much increased, the vessel feels like a firm chord, its coats are much thickened, and its cavity proportionally contracted; lymph is effused, and by it the canal may be obliterated to a greater or less extent. The disease is rarely met with in the upper extremities, but frequently in the lower limbs, in the scrotum, labium, lower part of the abdomen, in the neighbourhood of the anus, and at the lower part of the neck. Occasionally the contained blood coagulates, the canal of the vessel is thereby obliterated, and a spontaneous cure accomplished. But the coats of the vessel not unfrequently ulcerate, and blood is discharged in appalling profusion: and such an occurrence may prove rapidly fatal. In the lower limbs, the disease is often complicated with ulcers; and as long as the veins remain varicose, the ulcers are almost incurable, or if they are brought to cicatrize, the skin soon ulcerates again, and the disease is re-established.

The cause of this affection is obstruction to a free return of the blood; by means of tumours, either adventitious, or in the case of pregnancy, constipation, &c.; or by the tight application of a ligature round the limb, as of a garter. It often occurs in those who have been in the habit of great muscular exertion, the blood being thereby forced from the deep-seated veins into the superficial. The lower limb is perhaps the most common seat of the disease; when the veins in this situation are dilated, the valves are insufficient to obstruct the calibres of the vessels, and consequently the lower and smaller veins have to sustain the column of blood in the superficial veins of the whole limb, its weight not being diminished by the support, which, in the natural state of parts, is afforded by the valves; thereby the disease is aggravated. The left limb is generally the one affected; and this circumstance may probably be explained by the pressure of the sigmoid flexure of the colon on the left iliac veins.

In many cases, the treatment must be only palliative. The limb must be used as little as possible, and, if practicable, be kept in a state of complete rest; and the veins must also be supported by the application of a bandage, or the wearing of a laced stocking; in some instances, the application of cold has been of advantage, promoting the contraction of the dilated vessels. When pregnancy is the cause, it is needless to commence any method of cure, until the cause be removed; and the same remark is applicable when the affection arises from constipation. In certain

cases, the spontaneous cure, a radical one, may be imitated by the surgeon ; an escharotic being applied over the trunk of the vein at a healthy point, whereby inflammation is produced in the coats of the vessel, and obliteration of its cavity accomplished : the caustic which will be found most convenient and effectual, is the potassa fusa. The caustic may be made into a paste with soap ; or a solid piece, of the size of a split pea, is placed over the vein, and there retained for a few hours by a bandage. The vessel being obliterated, the lower veins necessarily pour their contents into those deeply seated ; as they freely communicate with these, they readily empty themselves of their accumulated contents, and soon regain their calibre under the employment of bandaging. When the varicose veins are numerous, as is generally the case, the potass is to be applied to the healthy point of the larger trunk in which they terminate. But the practice is not unattended with danger, for the coats of the vessel may ulcerate in consequence of the application, and violent hæmorrhage ensue ; and the degree of inflammation excited may be greater than that intended, and so extend as to give rise to the most alarming constitutional disturbance. These unfavourable results, however, must be of rare occurrence. Success has followed the practice in innumerable instances. Other operations have been performed on the veins, to procure a radical cure of varix ; a ligature has been passed round the vessel, as in the operation for aneurism ; and the vessel has been divided, or a portion of it dissected out, and its cut extremities

afterwards either compressed or secured. Such reprehensible proceedings are now almost entirely abandoned.

### OF TUMOURS.

A TUMOUR is a swelling of new production, and not a part of the original composition of the body. Blood may have been effused, and the coagulated part, becoming organized, is increased in size by deposits from the vessels which enter it ; and its structure and growth are modified according to the action which its own vessels assume, independently of the surrounding vascular system. The blood-vessels and nerves may enter this new growth by a narrow pedicle, or it may be of such a form as to present an extensive surface, by which it communicates with the surrounding parts, receiving vascular ramifications from them ; it may originate in blood accidentally effused, or in the coagulating lymph which has been deposited by a morbid action of the vessels. As the growth of the tumour proceeds, the surrounding parts yield, are condensed, and form an envelope for the new formation ; the neighbouring blood-vessels are excited to a greater degree of action, and more blood is poured into the vessels of the tumour ; these in their turn become more vigorous, and the increase of the new growth is more and more rapid. Morbid enlargement, or rather new productions, often attain an enormous size ; some have weighed, when recent,

upwards of 60 or 70 lbs. Tumours differ much in structure, and though their general appearance may not be dissimilar, one will scarcely be found exactly resembling another. In many cases, the external appearance proves no certain index of the nature of the tumour; sometimes, however, its feel and general external character leads the experienced surgeon to form a correct diagnosis of its internal structure. It is impossible, by any process of reasoning, to account for the different actions which these growths possess; and even minute anatomical investigation, both morbid and healthy, does not throw much light upon the subject.

Tumours are divided into *Solid* and *Encysted*. The solid are generally enveloped by a dense cellular sheath of the surrounding cellular substance, yielding and becoming condensed in proportion as the tumour increases in size; this covering appears as a barrier between the healthy and diseased parts, shutting out the latter, as much as possible, from connexion with the rest of the body, and preventing the former from participating in the injurious tendencies of the latter. Some tumours have no such limit, but extend in the direction where there is the least resistance, hold a free intercourse with the surrounding parts, and impart to them their morbid disposition and action. Others are limited in their situation and communications, but prove dangerous or annoying from their bulk. Some grow rapidly, and prove troublesome in a few weeks or months; others remain without much increase for years, and afford little or no inconve-

nience. Occasionally tumours partly resemble the texture in which they grow; those of a fatty nature are frequently found to have their nidus in the adipose tissue; cartilaginous tumours project from the articulating surfaces of the bones of a joint, or are subsequently detached, and lie loose in its cavity; growths of a cellular structure internally, and invested by an apparently mucous lining, protrude from the surface of mucous membranes. Others differ, not only from the texture in which they are situated, and from which they derive their nutritive vessels, but also from every other part of the healthy structure. In one instance a congenital tumour was composed of an aggregation of numerous materials, many of them resembling the healthy textures of the body.

The simple tumour is *mere enlargement* of a part, from the infiltration of solid matter deposited by its blood-vessels. There can be little doubt that the action which lays the foundation of such enlargement is inflammatory: In consequence of inflammation of the tissue, lymph is effused into the cellular substance during the progress of the incited action; and after it has subsided, the dilated and debilitated vessels probably do not regain their condition, as to size and vigour, but remain somewhat dilated, and continue to free themselves from portions of their contents; thus the cellular tissue is opened out in proportion as the infiltration advances, and the process may be occasionally accelerated by fresh attacks of subacute inflammatory action. The patient at first feels pain, heat, &c., as in an inflammatory tumour; these after-



wards abate, and ultimately go off entirely; and during the increase of the swelling, little or no pain is experienced, unless when these subacute inflammatory attacks supervene, and then it is but slight; or unless the enlargement be resisted by an unyielding structure, and then it is highly acute. The size and rapidity of increase in such tumours will vary according to circumstances; the vessels of the part soon regain their size and action, either by the efforts of nature or of art, so that the tumour will have attained no great size, and be stationary in its progress, being denied the materials necessary for its increase. If the morbid action be thus stopped, the absorbents will remove the newly-formed matter, and restore the parts to their healthy condition. But when the deposition proceeds in a superior ratio to absorption, the new matter becomes organized, and, by means of its own vessels, secretes a substance similar to itself, whereby the increase of the tumour becomes more rapid, and the new structure may attain an enormous bulk. Thus the tumour is formed, not merely by extension of the original tissue, but by the formation of new matter, which, becoming organized, assumes a secreting power. At first the former circumstance is the chief cause of the enlargement; but after the latter process has existed for some time, the tumour loses much of its resemblance to the primary tissue, assumes a more dense structure and a different action, and therefore cannot be designated a simple enlargement.

This species of tumour, or rather this enlargement

which precedes the formation of a tumour, is chiefly met with in the cellular and glandular structures. It has been confounded with œdematous swelling, but from this it differs, inasmuch as the infiltrated matter is in the former solid, whilst in the latter it is fluid: sometimes it is described under the term of œdema solidum. In the scrotum, where the cellular tissue is remarkably loose and extensile, such tumours attain a very large size. They are found in this country, though more frequently in warm climates. I removed one from this situation which weighed upwards of  $44\frac{1}{2}$  lbs. ; it had been of twelve years' duration, and caused much inconvenience to the patient. It occurs in the mamma, apparently in consequence of suppression of the menstrual discharge; the gland becomes enlarged, there is no pain in the tumour, and it feels soft and doughy. When the subcutaneous cellular tissue is the seat of the disease, the tumour is often of considerable extent, but rarely forms a great protuberance. It sometimes is situated in the coverings of the nose, which, as they become enlarged, lose their natural colour, and assume a purple hue; the mucous follicles also are often much enlarged, and occasionally emit a profuse discharge of their secretions. It can be readily understood, that in this situation the tumour is a source of much annoyance, from its partially obstructing respiration, and even vision, and interfering with the meals of the patient.

It has been already observed, that when simple enlargement exists for some time, the structure changes.

It becomes more dense, seems to consist chiefly of the fibrine of the blood, or of a substance resembling it, and assumes a peculiar action, independent of that of the surrounding parts. It has a harder and more firm feel, and all traces of the texture in which it was formed, are destroyed. It may be considered as the next in order to the one already mentioned, both as to the simplicity of its structure and action; but in consequence of its action being independent of those of the neighbouring parts, and liable to change from even slight causes, it is very apt to degenerate into those tumours, which are more complex and injurious.

### *Adipose Tumours.*

Another species of tumour seems to be composed almost entirely of fatty matter insinuated amongst extended and delicate cellular substance, and has been therefore termed *adipose*. It is surrounded by a cyst of dense cellular tissue, and to this it loosely adheres; its blood-vessels are few, and it is of an inactive and innocuous character. It is generally lobulated, and often attains a large size. It is not only irregularly prominent on its outer surface, but in its whole circumference, and its lobuli often insinuate themselves to a great depth amongst nerves, blood-vessels, and other important parts; and from this circumstance they frequently prove a source of the greatest inconvenience from their bulk, for of them-

selves they are neither hurtful, nor possess any disposition to involve those parts with which they are in contact. This tumour is found only in the cellular and adipose tissues. From its loose connexion with its envelope, it admits of ready removal by operation. Its adhesions, however, are rendered firm and more numerous by pressure or external stimulants, in fact, by whatever induces inflammatory action in its substance or in its surrounding connexions; and from this cause the extraction is rendered more difficult. The skin becomes thickened and of a red hue, and the tumour itself is much more vascular. From this cause it is apt to assume a new mode of action, and to change in structure and in character, invariably for the worse. I have removed a few tumours, originally of this benign species, but which had degenerated and assumed a malignant action. In one, distinct indurated bands, radiating from a central mass of the same kind, are discernible. In two others, as a consequence of pressure, condensation and ultimate softening had occurred. The largest alluded to was removed from betwixt the shoulders of a soldier, and had borne the pressure of his knapsack for eight or ten years. It was attached by a thickish neck, presented the common lobulated appearance of adipose sarcoma, but its external surface, its feel and section were very different.

The patient does not complain of any pain or uneasiness in the tumour, unless inflammation be excited in it; then the pain and other symptoms are such as attend inflammation, and the sensations which are

afterwards experienced vary according to the character which the tumour assumes. Certain changes may occur in its texture, though not in its general character or disposition ; thus osseous or earthy matter is occasionally deposited in some part of the tumour, while the surrounding adipose substance retains its appearance and density. In consequence of inflammation being excited, it occasionally suppurates.

### *Of Fibrous Tumours.*

*Fibrous* tumours are not uncommon, and are formed in various textures. In general, they are composed of a substance of a dirty grey colour and considerable density, through which minute, firm, ligamentous fibres ramify, in some cases irregularly, in others radiating from the centre of the tumour. The new formation is surrounded by condensed cellular tissue, to which it intimately adheres, and does not mingle irregularly with the surrounding parts, in this respect differing from malignant tumours, which occasionally contain fibrous matter. It cannot be considered of an equally innocuous nature with those already described, but is still, in its original state, not of a malignant disposition. After some time, the consistence and structure of such tumours vary ; some are of a loose texture and contain cells, others are hard, and intermixed with cartilaginous matter, or even with bone. In general, the tumour is slow in

its progress, though it may attain a large size if allowed to remain ; occasionally its growth is rapid.

Besides those tumours which have been described, there is a number of others not of a malignant disposition, which are so various in their structure as to baffle all attempts to reduce them to a scientific classification. Some are composed of a homogeneous substance of almost cartilaginous consistence and a whitish colour ; some consist of cartilaginous matter, mixed with substance of less density and of a different appearance ; in some, fibrous matter is mixed with a homogeneous glandular-looking substance, partially softened. Some are almost entirely composed of osseous matter ; others contain it in small proportion. It would be endless to enter into a minute detail of the structure of such tumours, for it may be said that their appearances vary with their number. In almost all tumours cysts are found, and the internal structure of some tumours consists almost entirely of cysts ; in others, these only occupy certain parts, and compose but a minor feature in the structure. The cysts are generally lined with a delicate and smooth membrane, which is often vascular at various points ; some contain a transparent and glairy fluid ; some, bloody serum ; some, purulent, some, curdy matter, or this mixed with a serous or purulent fluid ; some, pure blood ; some, a fluid like printer's ink ; and not a few are occupied by a dense elastic substance, which, on a section being made of the tumour, rises irregular and

ragged above the cut surface. Some tumours are smooth; others, lobulated or tuberculated.

### *Of Encephaloid Tumours.*

THE tumour which we shall next describe, is decidedly malignant. It is the *Encephaloid*, or the medullary sarcoma. This tumour consists of a homogeneous matter, resembling the substance of the brain in colour and consistence. It rarely has a distinct cyst, occasionally it is subdivided by ligamentous bands. It is always soft, though often more so in some parts than in others; portions of it being frequently so much softened and broken down, as to resemble purulent matter in consistence, and these are generally of a darker colour, from being mixed with a greater or less quantity of blood. Partial or universal softening only occurs after the tumour has existed for some time, for in its original state its structure and density are uniform throughout, and on making a section of it, some few drops of blood may escape from vessels, the coats of which are of a very delicate nature. Some of these vessels seem to give way, in consequence of the process of softening, for we frequently meet with fluid blood, or masses of fibrine, in the midst of the pulpy matter; and when the softening has been extensive, the blood is diffused throughout the whole substance of the tumour, so that it will appear to be chiefly, or entirely, composed of degenerated blood. The mamma and testicle are the

most frequent seats of this disease; it not unfrequently occurs in the lymphatic glands, and no texture can be considered as exempt from it. The part at first enlarges slowly, but afterwards the disease advances with great rapidity, involving the adjacent parts. In general, the affection is not attended with much pain; the part has a spongy and elastic feel, and frequently presents a sense of fluctuation, indicating that softening is more or less begun. The skin is tense, generally brownish, and is pervaded by large venous branches; this venous enlargement is always observable in the advanced stage of the disease, before or after ulceration has taken place; it is peculiarly evident in the eyelids, when the contents of the orbit are involved, and is to be attributed to obstruction of the circulation in the deeper vessels. The tumour is increased by the surrounding parts assuming a similar action, and being converted into a similar mass; and the disease also seems to be propagated by means of the absorbent system, and by the irritation conveyed along the vessels which emanate from the tumour, or from its immediate vicinity. Thus, when the testicle or mamma is affected, the lymphatic glands, both above and below the tumour, are converted into an encephaloid mass, all traces of their glandular structure being completely destroyed. When the disease has been of long duration, the superincumbent integuments appear tense, assume a purple colour, ultimately ulcerate; a portion of the pulpy mass then protrudes, of a fungous appearance, the resistance being at that point removed, and the compressed



matter relieving itself by the extension of a portion of its substance; the protruded portion afterwards becomes discoloured, and sloughs, to be speedily reproduced either by farther dilatation, or by actual increase of the tumour; unhealthy pus is discharged, often mixed with blood, and occasionally slight hæmorrhage occurs; the integuments become farther ulcerated, assume a dull brown colour widely around, and are undermined, presenting a boggy feel, and the discharge is much increased on pressure.

Along with these local symptoms, there is a complete subversion of the system,—there being at first symptoms of constitutional irritation, afterwards those of hectic and extreme exhaustion. When the lymphatic glands are diseased, the limb beneath is much swollen from œdematous effusion, the return of the blood and lymph being prevented; violent and excruciating pains are experienced in the course of the nerves of a limb; it also frequently loses its sensation, from those organs being either involved in the disease, or pressed on by the tumour. The vessels in the neighbourhood of the affected parts are materially altered, though they are seldom converted into encephaloid matter; the arteries are often completely obstructed by coagulating lymph for a considerable extent, and the coagulum not only occupies the principal trunk, but extends into the minute ramifications; and this explains why hæmorrhage seldom occurs, even after ulceration of the tumour is far advanced; the veins also are frequently obstructed in a similar way, but in many cases they contain a soft and pulpy

matter, exactly resembling the substance of the tumour. The fungus which protrudes after ulceration of the integuments, sometimes bleeds; when it would appear that the hæmorrhage proceeds from those bloody collections in the substance of the tumour already mentioned; for, according to my experience, when bloody points, or cysts containing bloody fluid, exist in a medullary or other tumour which has been removed, and if the diseased matter be reproduced, a bleeding fungus will certainly follow. This species of tumour occurs in all ages and in all situations, and during its progress evinces strong proofs of inveterate malignancy; if removed early, the disease may be arrested; but if the operation be long delayed, a tumour of a similar nature, and more extensive, will almost invariably be produced. In several instances I have removed encephaloid tumours, from the situation both of the mamma and testicle, and the disease did not return; but in the other cases, the result has been as above stated. Encephaloid disease of the internal organs frequently supervenes on that of the external parts, and accelerates the patient's dissolution; when in such situations, they are beyond the reach of surgical art, and their existence is only, if at all, ascertained, in order to enhance the unfavourable nature of the surgeon's prognosis. Adipose tumours, when irritated and inflamed, may, as formerly noticed, degenerate into an encephaloid nature, and present the same appearances with morbid growths encephaloid from the first, with this difference, that they retain their lobulated structure.

*Of Melanoid Tumours.*

THE *Melanoid* tumour is rather of rare occurrence in the human subject; it originates in the cellular tissue, and most frequently attacks the internal viscera; sometimes it occurs in the eyeball, and occasionally melanotic matter is diffused amongst the cellular tissue throughout the whole body, even in that of the bones. The external surface of the tumour is generally of a shining and mottled appearance; internally it consists of a homogeneous black matter infiltrated into the cellular tissue, which is condensed, and in some cases distinctly increased in vascularity. The tumour, seldom of a large size, extends chiefly in a lateral direction. Occasionally it is pretty firm; in other instances it is soft, broken down, and semifluid. The melanotic matter is not always so deposited as to form a distinct tumour, but frequently seems to be sparsely infiltrated into the cellular tissue; and occasionally it is diffused in so minute a quantity as merely to tinge the part, or form dark streaks. Sometimes it is infiltrated in the substance of an organ, and sometimes it is effused on its surface; occasionally it is surrounded by a distinct delicate sheath; usually, it is confined by no envelope, excepting the partial condensation of surrounding parts. The tumour is said to be composed chiefly of albumen, mixed with a peculiar colouring matter. The disease chiefly occurs in the trunk, seldom in the extremities; and in the internal organs the melanotic

deposits are generally both numerous and extensive. There is seldom pain, and the patient seems to suffer chiefly from lassitude and extreme debility, which gradually increase; anasarca frequently supervenes; the functions of the organs affected are much impeded, or even altogether destroyed, and thereby the sinking of the powers of life is accelerated according to the viscera affected, and the extent of the disease.

### *Of Carcinomatous Tumours.*

THE most malignant and intractable of tumours is the *Carcinomatous*. This term is applied to the disease in its occult state, whilst *Cancer* denotes its condition after ulceration. The word schirrus is often synonymous with carcinoma; but the former has been, and still is, improperly employed to denote indurations and enlargements of structures in all situations, and has been altogether so much abused as to warrant its being erased from the catalogue of diseases. Carcinoma seldom occurs before the age of thirty, and generally not till forty-five; there are instances, however, of it much earlier. Very frequently it is not primary, but supervenes on adventitious formations originally of an innocuous character, and which might have long remained so. All tumours, though at first not of a hurtful tendency, are liable to malignant action, either from a constitutional cause, from external injury, or from latent disposition. When it occurs in newly formed

parts, the surrounding cellular substance is frequently condensed and thickened, so as to form a cyst round the tumour; and when it supervenes on chronic tumours, the cysts which enveloped these remain, for some time, as entire and distinct as formerly, though the character of their contents is remarkably changed. Afterwards the cyst may be contaminated with the same disposition as its contents, assume the same action, and be converted into a similar substance. When the disease is seated in the lymphatic glands, the cyst is at first distinct, and gradually disappears; whilst in this affection of the conglomerated glands a cyst is at no time perceptible, and the carcinomatous matter insinuates itself, and is lost, in the surrounding substance. The carcinomatous tumour is of great density, and communicates a peculiarly grating sensation and noise when cut. In its section there appears a central point, or nucleus, from which dense ligamentous bands of a white colour proceed towards the circumference; diverging in regular succession, as rays of light from a luminous body; or the larger bands subdivide into smaller ones, which follow a similar course with their parent trunk, or ramify regularly; or, from the first, follow an irregular and intricate course, uniting with and crossing one another, so as to present a retiform appearance. In general, the interposed substance is of a greyish colour, extremely dense, and generally homogeneous, though sometimes granular. Often the ligamentous bands are so numerous, and so intimately interwoven, as to leave little or no room for any intervening substance. Sometimes, and most frequently in

the advanced state of the tumour, the greyish matter appears to have been broken down and removed, its situation being occupied by a glairy or turbid fluid, by a soft pulpy substance, or by blood; the parietes of such cysts are formed by the whitish bands, which sometimes appear to be much thickened and coated with a membranous lining. Frequently, as has been already observed, the external cyst or covering becomes assimilated to the substance of the tumour, and the ligamentous bands then shoot forward into the surrounding tissues, more especially the cellular and adipose, establish a new footing for the disease, and thereby gradually enlarge the boundaries of the original tumour. All parts in its immediate neighbourhood become affected, and none withstand its morbid, and, as it were, fascinating influence; bone, muscle, ligament, skin, and membrane, are successively or simultaneously involved; and even the blood-vessels and nerves. From what has been already said, it is almost superfluous to add, that the tumour is most malignant, incessantly encroaching on the neighbouring parts, and imparting to them its own disposition; and this too frequently continues to exist after the removal of the prime source and agent of the evil. The disease, in its commencement, occupies a minute and limited space; the tumour is of a stony hardness; is generally of a globular form, and irregular and unequal in its surface. Afterwards it gradually enlarges in the way already mentioned, remains movable for some time, but ultimately becomes fixed by the increased extent of its connexions.

By these circumstances, it can in general be readily distinguished from the tumours which, from the first, occupy a wide space, and are firmly fixed by intimate connexions with the surrounding parts. When the tumour has once been developed, its progress is slow and steady, being arrested, or made to recede, neither by the efforts of nature, nor by the interference of art. Pain is generally complained of in the region of the tumour, and is of a lancinating kind, compared by the patient to the passing of sharp instruments through the part; occasionally there is no pain in the new formation, and little inconvenience is caused by it. When the disease is left to itself, ulceration occurs, frequently at an early period; but sometimes only after the tumour has been of long duration. The superimposed integuments appear stretched, change their natural colour, assume a dusky or livid hue, become attenuated, and ultimately give way; the breach of surface not being caused by tension and pressure, but by the parts having assumed an action similar to that of the tumour. The ulcerated point slowly enlarges, a thin ichorous fluid is discharged, the surrounding integuments are of a dusky red, and the margins of the ulcer are thickened, callous, everted. Whilst the destructive action proceeds in a lateral direction, it at the same time advances towards the more deeply-seated parts, the cavity becomes excavated, irregular, and ragged; and the parts seem to be destroyed partly by ulceration and partly by sloughing. The exposed surface seldom aims at reparation; and when it does, the granulations are

greyish, hard, warty, and endowed with but little vitality; never investing the whole surface, but protruding from certain points, and presenting somewhat of a fungous character. The thin unhealthy discharge becomes profuse, and exhales a peculiarly fœtid odour, highly offensive to the patient and attendants. By these means the ulcerated cavity may attain an enormous size, presenting a most disgusting and lamentable spectacle. If the patient bear up under the profuse discharge, the greater part of the original tumour may be destroyed by the ulceration, and some attempts may be made at cicatrization; that is to say, the cavity may contract, and granulations be formed: but these are always unhealthy, and I may say carcinomatous, and often bleed profusely. New skin is seldom formed, the remaining parts resume their virulency, and the process of destruction again advances, surpassing the former both in extent and rapidity.

Along with these local symptoms and appearances, it can be readily understood that the constitution is, from the first, materially affected. The alimentary organs are deranged in function, the patient has a wan and sallow countenance, and is in general weak and much emaciated. After ulceration, the system is still more reduced by the discharge, the patient becomes hectic, and is often afflicted with diarrhœa; along with the other symptoms of extreme debility, the patient is anasarcomous, affected with cough and dyspnœa, or by other symptoms indicating disease of



some internal organ, and is ultimately carried off in a state of exhaustion.

The disease attacks all textures, but perhaps most frequently the mammary gland. The mamma diminishes in size from absorption of the fatty matter; the nipple is retracted, often to a great degree, and the surrounding integuments are of a purplish hue, and exude a sanious fluid; at length the nipple is completely destroyed by ulceration. In other instances the tumour is large, and there is a hard œdema of the integuments, the skin is thick, coarse, and of a dark red colour. The tumour soon adheres immovably to the subjacent muscles and ribs, converting the contiguous portion of the former into a substance similar to itself. There may be other varieties in the appearances and symptoms of carcinoma, but the above are those which are most frequently observed, and are sufficient to denote the general character of this species of tumour, and to show its peculiar and inveterate malignancy.

Ulcers or swellings, at first simple, may assume a malignant action, either carcinomatous or of another kind; thus, in one instance, a simple ulcer, produced by a burn, assumed a foul and unhealthy aspect, and ultimately degenerated into a most malignant sore. Various malignant actions commence in glands of the conglobate or conglomerate kind, at first simply enlarged from irritation or injury. The female breast often becomes indurated from a blow, or from milk abscess, and remains for a series of years, half a lifetime, without any perceptible change in the enlarge-

ment and induration ; but the tumour frequently is roused into activity at the critical time of life, and malignant action ultimately commences. The menstrual period ought to be particularly attended to in affections of the mamma more especially, but also in all tumours, ulcers, &c. ; for both during and before it, tumours become larger and more painful, the whole system appears to be excited, and all morbid actions seem to possess increased activity.

In this disease, as in the encephaloid, or soft cancer, as it has been called, the bloody masses, or sacs containing bloody fluid, are to be dreaded, and when they exist, are to be considered as very unfavourable ; for if, on the removal of a carcinomatous tumour, such appearances be found, the disease will certainly return, a new tumour, of even a worse character than the preceding, will be formed, a fungus will be protruded, and from this hæmorrhage will occur.

The lymphatic glands, both above and below the tumour, generally enlarge early in the disease, become hard, and cut like cartilage, and with a grating noise. Frequently they become converted into a dense and fibrous substance, resembling carcinoma ; sometimes they are softened and broken down at several points, and contain a purulent or bloody fluid. They enlarge, coalesce, and form irregular masses, which rise more and more above the surface ; the superimposed integuments give way, and then occur those destructive ravages by ulceration and sloughing already described. The lymphatic vessels entering these tumours and emerging from them, feel hard and wiry, as if thick-

ened. The integuments in the neighbourhood of the tumours, and in the course of these absorbents, are of a blue colour, and the veins enlarged and tortuous; the limb below the enlargement swells, and is œdematous. The absorbents often become affected months and years after the removal of the original and exciting tumour; the immediate cause being taken away, but the inherent disposition to malignant action being left, not to be eradicated. In fact, the disease generally returns, either in the original integuments, in the cicatrix, or in the glands; very frequently all are affected. Such enlargements of the glands have been said to arise, in the first instance, from irritation, and not from any participation in malignant action; and on this supposition, though extremely incorrect, cruel, bloody, unnecessary, and futile operations have been performed.

Cancer seizes either the mucous or the cutaneous surface, with hardness and a warty excrescence; this ulcerates, and is surrounded by a hardened base. The process of destruction advances, and the ulcerated part presents the same appearances as those of a sore arising from a similar action in a deeply-seated carcinomatous tumour. The glands also enlarge, and assume the same aspect as if they had been the original seat of the disease.

*Fungus Hæmatodes*

HAS been much confounded with medullary sarcoma, but the two diseases are materially different. Fungus hæmatodes almost always supervenes on other morbid formations, when they have been ulcerated and exposed; and the particular formation which most frequently precedes, is the medullo-sarcomatous; a bleeding fungus, however, occasionally protrudes from tumours of a different character, which, though they may have been at first simple, have degenerated, ulcerated, and assumed a malignant action. The disease certainly does not occur so frequently as some have asserted; for many, instead of limiting the application of the term to those fungous protrusions which bleed, honour, with the appellation of fungus hæmatodes, every growth which protrudes after the ulceration of a tumour, and every tumour which is unusually prominent, of soft consistence, and of a somewhat fungous appearance, although such have never shown any disposition to bleed, either spontaneously, or from irritation. But fungus hæmatodes, as the name implies, is truly a fungus which resembles blood; and as bloody, or blood-like tumours are formed from the rupture of some vessel of rather a large size, and as they almost invariably evince a tendency to profuse hæmorrhage, as a necessary consequence of the mode of their formation, the term is correctly applied only to those fungous growths which either have at one time emitted a discharge of blood,

and exhibit symptoms of a recurrence of the hæmorrhage, or which frequently pour out a quantity of blood, sometimes inconsiderable, but often profuse, and generally altogether uncontrollable. In short, the circumstances necessary to entitle a morbid formation to the appellation of fungus hæmatodes, are a fungous structure and appearance, and hæmorrhage proceeding from it to a greater or less degree, and with more or less frequency. Fungi are frequently met with, but there are certainly few fungi hæmatodes.

The excrescence is generally of a dark colour, resembling a mass of coagulated blood, but of more soft consistence, and its extremity is often of a sloughy appearance. It is evidently organized, for, on being injured even in a very slight degree, hæmorrhage ensues from the part which has been broken or contused, and frequently the growth bleeds spontaneously. At first the hæmorrhage is in general slight, but is often repeated, is very profuse, and in most instances cannot be arrested. The vessels in the substance of the morbid mass are diseased in their coats, and have altogether lost their power of contraction; they give way either spontaneously, or by laceration, and by their non-contraction, they appear to serve merely as passive tubes, through which the blood is poured out by the active vessels which supply them; the latter are not exposed to any of the causes which tend to produce speedy obstruction of their canals, therefore continue to transmit their contained fluid through their subservient branches, and from this the uncontrollable nature of the hæmorrhage can be

accounted for ; and from the number of vessels which supply the new structure, and which are thus employed, it can be readily imagined that the hæmorrhage will be profuse. In many instances, the application of firm pressure on the limb above the seat of the disease is insufficient to arrest the flow of blood ; and though this may, in some degree, be explained, by supposing the continued stream to be venous, still it must be confessed that the disease appears connected with a peculiar hæmorrhagic tendency. Frequently the fungus is found to communicate with, or rather to arise from, numerous cysts of a glossy appearance, from which also blood is copiously effused. The surrounding tissues are completely disorganized in the immediate neighbourhood, and also much altered in structure for a considerable extent around ; the muscles, besides their disorganization, have acquired a peculiar brown hue. Sometimes the hæmorrhage does not seem to proceed so much from the fungus as from the subjacent cysts ; for when a superficial incision or puncture is made into it, the bleeding is often inconsiderable, and only becomes alarming after masses of coagulated blood have been removed, and the cysts thereby exposed. Occasionally the fungus communicates with a cavity of enormous size, filled with blood, partly coagulated and partly fluid, and from the parietes of which the hæmorrhage proceeds. When the disease has supervened on a medullo-sarcomatous tumour, the coagulated blood is mixed with a substance resembling the brain in a state of putrescence. It may supervene on polypous tumours, particularly

of the antrum ; and of this I have seen several instances. Sometimes it is produced after the removal of a tumour apparently not of malignant character, and in this case it frequently does not appear till the wound has almost cicatrized. When once established, it proceeds with all its virulency. The diseased parts may be removed as frequently as they appear ; but they will be reproduced, and the disease will assume a still more frightful aspect, both in extent and malignity.

In consequence of the repeated and profuse loss of blood, *the* patient is gradually worn out, becomes hectic, is affected with nausea, vomiting, and indistinct articulation, with all the symptoms of extreme debility, and he generally sinks exhausted, or may be suddenly carried off by profuse hæmorrhage.

The size of the bleeding fungus is extremely various, but it is rarely large ; in fact, we frequently find, that the most violent hæmorrhage occurs from those of a small size ; and in illustration of this, I shall briefly relate the following case. A man, aged forty, had been afflicted for some time with ulceration in the ham, and exfoliation of the posterior part of the femur. The sore healed, but about two years afterwards, the cicatrix became ulcerated, and produced a very small fungus, resembling, in fact, a minute cluster of exuberant granulations ; from this, blood was effused in small quantity, and was easily restrained by the application of a bandage ; but the hæmorrhage returned at various intervals for upwards of a week, became extremely profuse and altogether uncontrol-

lable. By this the patient was greatly exhausted, and amputation was rendered absolutely necessary. On examining the limb, the lower portion of the femur was found somewhat enlarged, its internal structure completely destroyed, and the periosteum on the inner side much thickened. On the posterior and inner part of the bone, about three inches above its articulation, there was a small fungous tumour of an irregular surface, and of soft consistence, resembling congealed tallow. From this excrescence, the blood had been effused into a cyst formed amongst the muscles, and afterwards discharged externally. He recovered from the amputation, and remained well.

### *The Painful Tubercle,*

THOUGH of small size, and not possessed of malignant action or disposition, is a tumour of very great interest, on account of the excruciating pain with which it is accompanied. It is mostly situated in the subcutaneous cellular tissue, but not unfrequently in the intermuscular cellular substance; one tumour of this species which I removed, was so deep, as to be in immediate contact with the sheath of the posterior tibial nerve. The tumour, generally of the size of a garden pea, rarely exceeds that of a cherry. It is invested by a dense ligamentous cyst, to which it intimately adheres; but occasionally the capsule is thin and cellular: in many instances its surface is perfectly smooth, in others it is slightly nodulated.



It is not connected with any large nervous trunk ; but minute nervous fibrillæ can be readily traced expanding on its surface, and apparently entering its substance. Internally it is composed of numerous whitish fibres, of considerable density, ramifying irregularly throughout its structure ; and betwixt these is insinuated a firm substance, generally of a grey colour, and frequently of an almost cartilaginous consistence. Such is the structure most frequently observed ; but in this morbid formation, as in all others, the appearances may be said to vary in almost every instance. Sometimes the fibres are indistinct, and of a yellowish or dirty grey colour ; and the interfibrous matter is often found to vary in density and colour in different tumours, being at one time dense and almost transparent, at another, opaque and cartilaginous, and sometimes rather soft, brownish, and occasionally tinged with blood. From attentive examination, it appears extremely probable that the enlargement is at first produced by infiltration of lymph betwixt the fibrillæ of a nervous twig, which become separated and enclosed by the deposit—that they afterwards increase in size—that the interfibrous matter is deposited in greater quantity, and is farther condensed—and that thereby the nervous filaments are still more separated and extenuated. In short, it would appear that the fibrous matter is nervous, though altered, and that the interposed substance is organized and condensed lymph. The tumour, at first extremely minute, enlarges slowly ; when deep, it can only be obscurely felt, and its existence is with

difficulty discovered by manipulation ; but the attending symptoms are so peculiar, and so forcibly developed, as to lead the surgeon at once to an accurate diagnosis. When it is subcutaneous, the skin is rendered slightly prominent, and the size, density, and loose connexions of the growth, are readily ascertained. The slightest pressure causes the most excruciating torment, and totally unmans the patient, even though induced by the most trifling movement of the adjoining muscles. From a fearful and well-grounded knowledge of this circumstance, the patient is extremely anxious to preserve the limb in a state of complete rest, and, in fact, he is wholly unable to use it ; and although the part is completely set at rest, still he frequently suffers from paroxysms of severe pain, commencing in the tumour and shooting through the limb. Often the painful sensations are very much alleviated by gentle friction with the hand. The disease is most frequent in the extremities, and in the inferior more than in the superior.

The larger nervous trunks sometimes become diseased, being affected with an enlargement resembling the structure and appearance of the preceding tumour, and such enlargements are termed *Neuromata*. Occasionally a portion of a nervous trunk is thus enlarged, from a blow or wound ; and sometimes there can be no cause assigned. The disease, however, is usually met with after division of the nerves by amputation ; and the former frequency of such tumour was, perhaps, caused by the practice of including artery, nerve, and a large portion of the

surrounding parts, in one ligature. The divided extremity swells, becomes hard and firm, adheres to the cicatrix, and frequently to the ligamentous covering of the rounded extremity of the bone, and presents the same structure as the painful tubercle. The nervous trunk above the neuroma is, in general, slightly enlarged, sometimes of a tortuous course; and in some instances, the neurilemal blood-vessels are considerably increased in size. The same painful symptoms exist, though in a less acute form, as in the preceding disease.

### *Of Polypus.*

A COMMON species of tumour is that which is attached to a mucous surface, and is called POLYPUS. Polypi vary in structure and disposition; some are simple and benign, others are most malignant. The simple mucous polypus is of a shining appearance, being invested by an extremely delicate membrane, in some degree resembling the mucous, and moistened by a fluid similar to the mucous secretion; it is of soft consistence and homogeneous structure, and appears to be almost entirely composed of a gelatinous substance. They are generally light brown, sometimes greyish; and almost always diaphanous. They are connected to the mucous membrane by a narrow pedicle; generally occur in clusters, and are of pyriform shape; one or more are often suspended from one narrow base, and they seldom

attain a large size. They possess but little vascularity, though occasionally minute vessels are seen ramifying pretty freely on their surface, and may be considered as almost devoid of sensibility. The malignant polypus, on the contrary, is always attached to the mucous membrane, and also to the subjacent parts, by means of a broad base; and its form and structure vary according to the particular action which it has assumed. Most frequently it is encephaloid, of an irregular form, and often presenting a cauliflower appearance, its surface being studded with numerous excrescences, of medullary consistence and colour. Such tumours will be afterwards treated of, as occurring in different situations.

#### OF ENCYSTED TUMOURS.

ALONG with these have been classed the enlargements of bursæ, sheaths of tendons, &c., but with equal propriety might we include hydrocele and other collections in natural cavities. Encysted tumours are almost always situated superficially. The skin is distended, seldom inflamed, and often contains enlarged blood-vessels, which give it a streaked appearance. They consist of an external cyst, which is in some instances extremely thin and delicate, in others dense, of considerable thickness, and composed of ligamentous-looking substance, occasionally it is almost cartilaginous; the internal structure may be said to be almost always more or less fluid, but varies much in

consistence. The tumour is surrounded with condensed cellular substance, which is of greater or less thickness and strength according to the size of the tumour. Some of these tumours are supposed, and on good grounds, to be mere enlargements of the natural mucous follicles, in consequence of obstruction in their ducts, by hardened and vitiated secretion; the cyst, therefore, will be at first thin and delicate; its contents will resemble the natural secretion of the follicle, and in many cases may be readily squeezed out by the pressure of the thumb and forefinger. There is a black point on the most prominent part, marking the obstructed orifice of the follicle, and the sac is found to adhere firmly to the skin. Even after all other marks of its original formation have disappeared, the situation of the orifice is indicated by small dark spots, by depression, or by a minute ulcer.

Encysted tumours, or wens, as they have been called, often appear to be hereditary; seldom occur single, and are met with under the surface of all parts of the body. They have been divided into different classes, according to the nature of their contents: *Atheromatous*, containing curdy matter; *Meliceritous*, containing a substance like honey; and *Steatomatous*, containing fatty matter, generally in a semifluid condition. But such terms are not adequate to express the nature of the internal structures; for encysted tumours, like all others, are extremely various in their actions, and their contents vary according to the particular secretory action which the lining membrane of the cyst assumes; for the same

reason, also, the contents of a tumour will differ in the different stages of its progress. Some contain a thin foetid brown fluid, mixed with solid particles, resembling half-dissolved fibrinous matter; in some the contents are serous, or sero-purulent,—in others they are gelatinous; whilst in those which have become inflamed from external irritation, the contents are altogether purulent, or contain a very considerable proportion of that fluid; not unfrequently the cyst is covered internally by a layer of calcareous matter, to which similar particles are loosely attached. Sometimes, in consequence of irritation, the contents become organized, are condensed by the effusion of solid matter from the newly-formed vessels, adhere firmly to the inner surface of the cyst, and are often disposed in concentric laminae.

Not unfrequently the most prominent parts of the tumour ulcerate, and on the exposed surface is deposited a substance of semifluid consistence and gelatinous appearance, which afterwards increases in density, and ultimately assumes all the characters of horn. This hard excrescence in some instances increases only to a slight degree, and afterwards remains stationary; in others it attains a large size, both as to length and breadth, and occasionally assumes a curved or tortuous form, like that of the horns of inferior animals. Horns are generally met with on the forehead, and the scalp may be said to be their seat. The largest which I have seen measured seven inches in length, and two in circumference; but others have been removed still larger.

Sometimes the contents are vesicular, and in such cases the cyst is usually dense and firm. In many encysted tumours, hairs grow from the internal membrane of the cyst, often numerous, and are generally found in those situated on the eyelids; in some the hairs are destitute of bulbs, lie loose within the tumour, and are often rolled into a globular form. The adhesions of these tumours are in general very slight and easily broken up, but when seated amongst tendons, or in unyielding parts, they are often extremely firm. Violent inflammatory action may follow injuries of the tumours, or the making of minute openings into them; suppuration occurs, the discharge is thin, fœtid, and often bloody; there is much pain, and frequently severe constitutional irritation. Occasionally, a fungus, bleeding or not, is protruded through the aperture; more frequently, however, the opening heals, and the tumour remains as before. External injuries sometimes appear to check the secreting action, and to excite the absorbents to remove the morbid growths, and this with or without rupture of the cyst. Thus, in the case of an encysted tumour the size of a hen's egg, on the external lateral ligament of the knee joint, free and pretty rough manipulation was necessary to ascertain its nature and exact situation; in consequence of which, the tumour gradually disappeared, and no traces of it remained twelve days afterwards. Others, of less size, I have known to disappear in a much shorter period.

## OF TUMOURS OF BONES.

THE arteries of bones, in their healthy state, are feeble, but like other feeble parts they are irritable, and are apt to assume diseased actions of an obstinate and unyielding nature.

The morbid growths vary much in texture. The most frequent are the osseous, or those of the same structure with the original bone; but even these differ much in the density and arrangement of their particles; they have been termed *exostoses*. They may be of great density, and are then called the hard, or ivory; these never attain a large size, seldom exceed that of a bean, have a smooth and polished surface, and are of a flattened and hemispheroidal form, their greatest circumference being at the base; they occur in many of the bones, but generally in those of the cranium and face.

Others, being of a more loose and spongy texture, have been called cancellated. These are commonly formed by the bones of the extremities, and often attain a very considerable size. Sometimes they adhere by a narrow neck, and expand into a bulbous form, so that they can be very readily removed by operation, and are very apt to be broken off by external injury. Others have a broad and firmer attachment, and are of an irregular shape, often projecting in the form of a large spicula, and at other times assuming a somewhat stalactical appearance. Such frequently prove the source of much inconvenience, by



impeding the motions of the muscles, or disturbing the functions of any adjoining organ. They possess no malignant disposition, but are under the same laws, though perhaps in a less degree, with their parent trunk.

On making sections of exostoses, and of the bones from which they arise, some appear to be mere enlargements or processes of the parent bone, the cancellated tissue extending itself so as to form the interior of the exostoses, whilst the exterior resembles a proportionate extension of the outer lamina. Others are evidently formed by the deposition of osseous matter externally to the outer lamina, many being dense and compact throughout, others containing an internal cancellated structure, but which is not continuous with that of the bone, as it is separated by the natural outer lamina. Their formation appears to be similar to that of the foetal bones: a glutinous matter is effused, becomes dense, and is converted into cartilage; blood-vessels shoot into it, ramify throughout its whole structure in a radiated form, and deposit osseous matter. This deposit increases, and extends from a central nucleus towards the circumference, the cartilage is absorbed, and the new structure becomes osseous, and similar to the original tissue by the vessels of which it was formed. The former are of the most rapid growth, and attain the largest size; the latter are of an indolent character, and are covered externally by thickened periosteum, to which they intimately adhere.

Frequently a bone is much enlarged throughout

its whole extent, or the greater part of it, and of a cancellated texture; sometimes, also, it is much thickened, and, at the same time, of great solidity; but such enlargements cannot be considered as tumours of bones, or exostoses, any more than those nodules of new osseous matter, which are effused in consequence of inflammation of the osseous tissue. The most frequent cause of exostoses, appears to be external injury; their progress is slow, attended with slight dull pain, and often accompanied with no inconvenience; their existence can be readily ascertained, a hard and immovable body being felt where no bone exists in the natural state of parts; but when the tumour projects into an internal cavity, the diagnosis is rendered obscure. Being possessed of but little vitality, they are ill able to withstand any incited action; and hence not unfrequently die, producing all the usual symptoms of necrosis; such a termination is less frequent than their structure and organization would lead us to imagine. Most frequently, they remain stationary, after having attained a certain size, and are productive of little inconvenience, the surrounding parts having accommodated themselves to the new formation. Occasionally, suppuration occurs in the soft parts, the matter comes to the surface, and a troublesome abscess is formed.

To this class of tumours would I confine the term exostosis, not including those consisting of softer materials, and possessed of a less benign action.

*Of Osteosarcoma.*

BY this term is meant, an enlargement and alteration in the structure of a bone, accompanied with the deposition of a morbid sarcomatous substance internally. This morbid change appears to be the consequence of inflammation, and its origin is frequently attributed to some mechanical injury or local irritation. In the commencement of the disease, the bone is slightly enlarged, perhaps somewhat thickened in its outer laminæ; and on a section of it being made, is found to contain a brown fleshy substance instead of its cancelli. This appears to be formed in consequence of a morbid action, perhaps inflammatory, of its internal structure. By the pressure of the new formation, the parietes of the bone are pushed outwards, in some cases attenuated, in others thickened by deposition of new osseous matter, inflammatory action having been induced by the pressure. As the internal formation increases, the parietes are extended, and are generally much attenuated, becoming in some places thin as paper, and diaphanous; they also would seem to lose a portion of their earthy matter, for they are flexible, somewhat elastic, and not of their usual density. Frequently they are in several places deficient, and their situation occupied by a membranous expansion, sometimes thin and delicate, but mostly thick and ligamentous; in some cases, the external lamina appears to be converted into a substance resembling the internal growth, with which it

is continuous. The investing periosteum is much thickened, and its blood-vessels are enlarged. Occasionally, the deficiency of the bone is not supplied by any membranous expansion, and the morbid growth protrudes, fungous. The internal structure varies much in appearance ; generally it is brown and soft, in some places broken down and mixed with a dark-coloured fluid, or with purulent matter ; sometimes it is much more dense, and resembles cartilage ; in others, the cavity contains an ichorous fluid, mixed with small portions of more solid matter ; in the advanced stage of the disease, the contents are often of the encephaloid nature, either in its homogeneous and solid form, or softened, broken down, and mixed with blood, or with a lard-like substance. Sometimes the cancelli of the bone are not destroyed, but extended, forming numerous cavities of considerable size, in which the morbid matter is deposited ; in other instances, there is no appearance of cancellated structure, and the diseased mass contains rough osseous spiculæ, some detached, some loosely connected with each other, and others projecting from the inner surface of the bony parietes of the tumour. At the commencement of the disease, the patient feels acute pain in the part, the constitution is disturbed ; afterwards, the pain becomes more dull, and there is a considerable swelling externally, which feels hard, and slightly elastic ; in the advanced stage, the pain again becomes severe, and is of a lancinating kind, and the system is much deranged, the tumour is softer, often presents a sense of distinct fluctuation,

and on being freely handled, is found to crepitate, in consequence of the loose spiculæ of bone rubbing upon each other. Ultimately, the integuments become tense, livid, or dark-red, ulcerate, and allow a portion of the softened tumour to protrude, in the form of a frightful fungus; there is profuse discharge, thin, and sometimes bloody; there is much constitutional irritation, and the patient is greatly exhausted. Not unfrequently, during the progress of the disease, especially in the long bones, fracture occurs at the diseased part, from either external injury, or sudden muscular exertion; the fracture does not unite, the rough and loose ends of the bone are a cause of much irritation, inflammatory action is kindled in the morbid structure, suppuration occurs, the integuments give way, and ulcerate to a greater or less extent, and the advancement of the disease is much hastened. The tumour may be safely pronounced malignant; it is true, that for some time it shows no tendency to involve the adjoining soft parts, further than by the effects of inflammation induced by its pressure; but then, it is limited by the external lamina of the bones, which confines it to the tissue in which it originated; but after this barrier has given way, the tumour projects through the aperture, contaminating the adjacent soft parts, imparting to them a morbid action, and extending in the cancellated tissue of the shaft of the bone. In some cases, the integuments are tense and discoloured, with large vessels running on their surface, the tumour feels soft and fluctu-

ating, though the skin may not ulcerate till long afterwards. Perhaps the common seat of this disease is the under-jaw, but it may occur in any of the bones ; when it has been of chronic duration, not one bone, but several, are affected ; and in one case which I saw, the disease commenced in the under-jaw, which it deformed to a frightful degree, and almost every bone in the body was similarly, though less extensively, diseased, as could be readily observed during the life of the patient. From this circumstance, it appears, that the affection is not only dependent on local causes, but connected with a morbid state of the constitution, predisposing to it, and co-operating with its exciting cause.

There are other tumours of bones in some degree resembling, which do not strictly come under the term, Osteosarcoma. Some are wholly cartilaginous, emitting a gelatinous fluid when cut, but containing no cells ; others are not uncommon, partly osseous, and partly cartilaginous, containing cells filled with a glairy fluid ; others are composed of cartilage, intersected with dense fibrous matter, in a greater or less proportion. In fact, the individual tumours of bones vary as much from one another as those of the softer tissues ; no two are alike in their progress, action, or anatomical characters. Such tumours, having been of considerable duration, and attained a certain size, often assume a malignant action. Irregular spiculæ of bone are found in many parts of their structure ; in many places they are softened

and broken down, the partitions between the cells are destroyed, and these contain a pulpy mass of a dark sanious appearance. On making a section, they are observed to be continuous with the interior of the bone, which is converted into a substance similar to themselves, or is of a more soft and medullary character. The external surface becomes tuberculated, the integuments are painful, and changed in appearance; they ulcerate, the tubercles burst, the discharge is thin and bloody, the ulceration extends; not unfrequently a fungus protrudes, and occasionally bleeds; this may slough, the tumour becomes farther exposed, portions of it die, and are discharged, unhealthy fungous granulations project from amongst the cancelli of the tumour, and emit an unhealthy discharge, often bloody; severe constitutional irritation accompanies this state, the patient becomes hectic, is much exhausted, and sinks, unless the morbid parts be removed.

### *Spina Ventosa.*

BY this term is understood a mere expansion of a bone from a collection of matter in its substance. The disease may be produced by external injury, exciting inflammation, and consequent suppuration, in the cancellated tissue; or the inflammatory action may be of a less acute kind, in a weakened and unhealthy constitution. The fluid accumulates, the cancelli are broken down, and the much-attenuated parietes of

the bone are pressed outwards. Occasionally inflammatory action is excited on the external surface, from the pressure of the contained fluid, and minute nodules of bony matter are effused, as if nature endeavoured to strengthen those walls which are daily becoming thinner, and more incapable of supporting the weight of those parts which they encircle. The disease differs from Osteosarcoma in the contents being uniformly fluid, generally purulent, though often mixed with more liquid and dark-coloured matter, or with a curdy substance—in the gradual extension of the bone, in no fungus protruding after a portion of the attenuated bone has given way, but matter being discharged as from a common abscess; and in the tumour not being of a malignant disposition. At first there is considerable pain in the part whilst the matter is forming, but afterwards it becomes much less acute, and in many instances there is no inconvenience, except from the bulk of the tumour. Often after having reached no very large size, it becomes stationary, neither recedes nor enlarges, and all painful sensations cease; in other cases it enlarges gradually, attains an enormous size, and produces much disturbance of the constitution; but in such instances the patient is generally weak and cachectic. The largest tumour of this species which I have seen, occurred in the lower part of the femur. In breadth, seven inches, in length, seven and one-fourth. The parietes were composed of an extremely thin lamina of bone, and in this there were numerous deficiencies supplied by delicate ligamentous matter;



its cavity was divided into several compartments by thin septa, partly osséous and partly membranous. The patient was a boy of twelve years of age ; amputation of the limb was earnestly advised, the friends objected, he died hectic. Generally, however, the tumour is of the size of a hen's egg, and but seldom exceeds that of an orange.

Besides these tumours, I have met with a species of an anomalous character, appearing to arise from an aneurismal state of the cancellated structure, and partaking somewhat of the fungus hæmatodes. I shall detail shortly the more important circumstances of the case. The patient, a lad aged sixteen, was admitted into a public hospital on the 7th of November, 1819, on account of a tumour over the left scapula. It was there deemed imprudent and inadvisable to attempt operation ; and, after the application of leeches, he was dismissed, at the end of eight days, as incurable. On the 15th he applied to me. The tumour was very large, hard, inelastic, firmly attached to the left scapula, and extending from its spine over all its lower surface. It also stretched into the axilla to within half an inch of the nervous and vascular plexus, and a large arterial trunk could be felt along its under surface. The arm hung useless, and, from the wasting of the muscles, was hardly half the size of the other. According to his own account, the uneasiness produced by the tumour was trifling when compared with the lancinating and excruciating pains in the limb. On attempting to move the tumour independently of the scapula, cre-

pitiation was distinctly perceived, as if from fracture of osseous spiculæ. A tumour was first perceived about three months previous, situated immediately below the spine of the scapula, about the size of a filbert, of a flat form, and attended with distinct pulsation; it had subsequently increased with great rapidity. About ten days before his admission into the hospital, it had been punctured; nothing save blood escaped. It was evident from the rapid growth of the tumour, and the severity of the symptoms, that the patient would soon be destroyed if no operation were attempted. There were no signs of evil in the thoracic viscera, the ribs and intercostal muscles were unaffected; though the tumour was firmly fixed to the scapula, yet that bone was movable as the one on the opposite side, and the vessels and nerves in the axilla were quite unconnected with the swelling. The operation was commenced by making an incision, from the axilla to the lower and posterior part of the tumour. The latissimus dorsi was then cut across at about two inches from its insertion, so as to expose the inner edge of the tumour, with a view to tie the subscapular artery in the first instance; in this, however, I was foiled, owing to its depth. I then proceeded to dissect, where I expected vessels to enter from the suprascapular; and in detaching the tumour from the spine of the scapula, I felt my fingers and knife dip into the tumour. This was attended with a profuse gush of florid blood, with coagula; by a sponge thrust into the cavity, the hæmorrhage was in a great degree arrested; at the same time an at-

tempt made to compress the subclavian failed, on account of the arm being much raised to facilitate the dissection in the axilla. The patient, exhausted, made some efforts to vomit, and dropped his head from the pillow, pale, cold, and almost lifeless. Then only I became aware of the nature of the case—nothing but a bold stroke of the knife could rescue the boy. Withdrawing the sponge, I by one rapid incision completely separated the upper edge of the tumour, so as to expose its cavity; and, directed by the warm gush of blood, immediately secured with my finger a large vessel at the upper corner, which with open mouth was pouring its contents into the sac. With my right hand I then removed the coagula, and, dissecting under my finger, separated the great subscapular artery, so that an aneurism needle was passed under it at its origin from the axillary, and about an inch from the sac. After securing this and two other large vessels which supplied the cavity, I dissected off the tumour from the ribs without farther hæmorrhage, cutting the diseased scapula and the under part of the sac. I then found it necessary to saw off the ragged and spongy part of the scapula, leaving only about a fourth part of that bone, containing the glenoid cavity, processes, and half of its spine. The edges of the wound were brought together, and the patient lifted cautiously to bed. At this time he was pale, almost insensible, and without any pulsation perceptible through the integuments, in the greater arteries, though the ends of the vessels in the wound beat very forcibly. Stimuli were employed externally and

internally; in the evening his pulse at the wrist was ninety, and soft.

The sac of the tumour was composed of bony matter, containing little earth, and arranged in strata of short fibres pointing to the cavity. Its outer surface was smooth, and covered by a dense membrane; whereas the inner, to which so equable a resistance was not afforded, was studded with projecting spiculæ. The lower part of the scapula, partially absorbed, lay in the middle of the sac, covered by the remains of its muscles and coagula. Very large vessels were perceived ramifying on the surface of the tumour.

On the 23d, he was so well as to be out of bed in the forenoon for a considerable time. On the 26th, the wound, contracting rapidly, was completely filled up with healthy granulations. The discharge had never been profuse; his pulse was eighty, and soft, and all the functions were natural. On the 7th of December, the wound had opened out a little at its upper angle, but was granulating, and filling up rapidly from the bottom; the ligatures were still firm. His health was quite re-established, and he returned to the country. He continued to improve for a considerable time afterwards; but the sore began to assume an unhealthy appearance, and at the upper part of the wound, about an inch from the point where the suprascapular artery had been tied, there arose a fungous excrescence about the size of a walnut, and of a dark purple colour. This was first observed of a bluish tint, on the 27th December, and next morning, when the patient awoke, he was

drenched in blood. The hæmorrhage stopped spontaneously, and, on removing the dressings, was found to have proceeded from the fungus. Blood continued to ooze from the part. The fungus appeared to project from under the cut surface of the scapula, and gradually increased in size. He complained of little or no pain in the parts, and the arm had regained its wonted size, though not its power. I went to visit him in the country, and, during my stay, hæmorrhage recurred to an alarming extent; and, on exposing the shoulder, arterial blood was flowing from the sides of the dark-coloured tumour. Although this had every appearance of being organized, I had, from the first, doubts regarding it, and on the idea that it was merely coagulum, as it proved to be, twisted off the projecting part, and with my fingers cleansed the cavity down to the bone. I then dilated the opening in the integuments with a probe-pointed bistoury, so as to assure myself, by actual inspection of the bone, that the blood proceeded from its substance. By the application of dossils of lint, the hæmorrhage was easily commanded, and the whole being secured by a firm bandage, he next day arrived safely in town. I at this time proposed the removal of the diseased bone and arm, but was in this opposed by the consulting surgeons. On the removal of the dressings, no bleeding occurred, and every thing looked so well, that I for some time flattered myself that, by dressing the wound from the bottom, and applying escharotics, or the actual cautery, to the diseased bone, a firmer cicatrix might be obtained. The solution of the

nitrate of mercury was applied by means of lint. Small fungi, at first like flabby granulations, gradually assuming a dark-red colour, frequently appeared. If allowed to run their course, they burst with considerable hæmorrhage, and the same result that occurred in the country was to be apprehended. At their first appearance, however, I opened them, and stuffed the cavity to the bone, to which they uniformly led, with lint wet with the caustic solution. By these means the hæmorrhage was restrained during the three weeks that he remained in town. The wound, nevertheless, became filled with loose spongy granulations; and, apparently from the enlargement and disease of the glenoid cavity, the head of the humerus was dislodged and dislocated forward. This was attended with much pain, and swelling of the top of the shoulder. As the disease was out of the reach of external applications, and as the more severe of these only added to his suffering without affording any prospect of benefit, I again proposed the removal of the remaining portion of the scapula, with the arm and half of the clavicle. But as I could get no one to second me in my opinion, I was very unwillingly obliged to give up all thoughts of operating, and accordingly sent the patient home. At this time a severe cough and profuse expectoration came on, with symptoms of hectic.

There was a very copious discharge of thin matter from the sore, and also from an opening which formed on the top of the shoulder. This relieved the hectic symptoms, and the cough entirely left him. No

hæmorrhage occurred from the wound, more than an occasional oozing. Meantime the sore extended, chiefly towards the axilla, and there appeared to be an immense collection of coagula in the wound, retained only by a thin layer of coagulating lymph. The discharge from the flabby granulations was very offensive, and the head of the humerus could be felt lying on the fore part of the joint, and out of the glenoid cavity. He became much emaciated, his appetite failed, he gradually sunk, and died five months after the performance of the operation. I obtained the diseased parts, which presented the following appearances. Portions of the acromion process, superior costa, and spine of the scapula, were of their natural appearance. But the coracoid process, the glenoid cavity, and the cervix, were entirely destroyed, and their situation occupied by an irregular broken-down tumour, consisting of osseous spiculæ, and cancelli, irregularly disposed, and forming cavities which were filled with blood, partly fluid and partly coagulated. The head of the humerus was extensively absorbed. The articulating cartilage was almost entirely destroyed, particularly on the inner side, where a large portion of the bony matter had also been removed. The ulcerated surfaces were of a dark, bloody colour.

In reviewing the particulars of this case, no one can doubt that the diseased parts could have been readily removed along with the limb, and that the operation would have afforded a good chance of recovery.

*Treatment of Tumours.*

IT may be observed generally, that tumours can derive no benefit from external applications, as liniments, ointments, friction, &c. ; and that, therefore, it is injudicious to employ such temporising measures ; for though a tumour at its commencement appear to be of a very harmless nature, yet it may soon assume a most malignant character. If an apparently simple tumour increase, and exhibit symptoms of inflammation, it will perhaps be advantageous to apply leeches, to arrest that incited action which affords the accession of new materials ; this, however, cannot check the morbid activity inherent in the new formation, it only delays its augmenting. If a tumour is to be removed by external applications, it is evident that these must be such as shall prevent the deposit of new matter, and allow the absorbents to remove that which already exists ; for absorption is always going on in a tumour, though it leaves no evidence of its progress, on account of the deposition of new matter exceeding the removal of the old. Now, remedies capable of performing the above indication, are extremely rare, and I must say that I am acquainted with none of them. The removal of a swelled gland, which has become enlarged from unorganized matter infiltrated into its texture, may occasionally be accelerated by such means ; but to trifle so with a new



and independent growth, is altogether absurd. The knife only is to be depended on.

Many of the tumours first described have no malignant disposition originally, and only require surgical interference when they produce deformity or inconvenience from their bulk. Yet even they ought not to be allowed to attain any great size, however indolent they may appear, and however little pain they may produce; for there is always a danger of their assuming a malignant tendency, or forming connexions with important parts, so as to render their removal either altogether impracticable, or at least attended with much difficulty. Tumours of every kind, when seated near important organs, must be early removed. Glandular tumours, however, even when of great size and long continuance, are not to be rashly interfered with, when they arise from irritation in the neighbourhood.

Those in which it is feared that malignant action has commenced, cannot be trifled with; and the only means which afford a chance of the patient's being effectually delivered from them, is operation. For this purpose, the external incisions ought always to be free, so as to admit of the after dissection being easily and rapidly performed; they ought also to be made in the direction of the muscular fibres, whether these lie above or beneath the tumour. In this way, the margins of the wound are easily brought into apposition, and there retained; whereas, if the fibres be divided transversely, the wound will gape, and union by the first intention be rendered absolutely impossi-

ble. If there is no reason to suppose that the tumour is malignant, little or no integument ought to be removed, unless the growth is of a large size; but when malignity is dreaded, all the discoloured, tense, and adherent integument ought to be taken away, and the incisions are to be made at a distance from the disease. In all cases, they ought to commence at the point where the principal vessels enter; these are thus divided at the outset, can be readily secured by ligature, or by the fingers of an assistant, and the dissection is proceeded in without risk of farther hæmorrhage. If the opposite course be pursued, the vessels will be divided two or more times during the operation, and thus the performance of it will either be delayed by the application of numerous ligatures, or will be attended with a considerable loss of blood. After the tumour has been exposed, it ought to be principally detached in one direction, and not first cut on one side and then on another, as in this way its removal will be sooner accomplished. If malignant, great care should be taken that all the diseased mass be removed, for a minute portion remaining may form a nucleus in which similar diseased actions may arise; and, in most instances, it will be prudent not only to remove the parts actually diseased, but those also which are in immediate connexion with the tumour, though at the time they appear healthy. All important parts must be carefully avoided. After removal of the mass, the edges of the wound must be approximated, so as to favour union, by the first intention; if this fail, granulation must

be promoted, and the wound dressed according to the particular circumstances of the case. All operations on malignant tumours, in their advanced stages, are unwarrantable ; they are necessarily painful and severe, and cruel because unavailing ; they may indeed expedite the dissolution of the patient. If the integuments over the tumour have ulcerated, and if the lymphatics in the neighbourhood are diseased, the disease, if removed, will be reproduced, and the succeeding tumour will be still more malignant. The operation ought to be performed when the disease is in its incipient state, for then only can the operator hope for success.

*Exostoses* need not be interfered with, unless they are the source of much inconvenience, either from their size and form, or from their having been detached, and lodged amongst the adjacent soft parts. If loose, they can be removed in the same way as any other extraneous body ; if firm, their attachment can be divided by a saw, or by cutting pliers. *Osteosarcomatous* tumours are to be taken away, along with the part of the bone in which they are imbedded, and, if possible, before the integuments have ulcerated. The incisions must be made, and the bone sawn, at a healthy part. In *spina ventosa*, more is seldom required than to lay open the cavity, give vent to the matter, and then treat on the same principles as in an abscess of the soft parts. The cellular tumours, partly cartilaginous, partly osseous, ought not to remain ; the operation can generally be done without much difficulty ; and thus the danger of their dege-

nerating avoided. Frequently, however, a considerable part of the bone must be removed along with the tumour, since the neighbouring bone is generally softened, and intimately adherent to the diseased part, which it somewhat resembles in structure.

In general, regular dissection is unnecessary in the removal of encysted tumours. An incision is made, or an elliptical portion cut out; the contents escape, and the cyst, being then laid hold of by dissecting forceps, is readily separated. In some situations, as on the eyelids, under the tongue, or amongst tendons, the sac is not so easy of extraction; it is then inseparable, either naturally, or from previous inflammation. Caustic is used with safety to destroy those parts which cannot be detached, and for this purpose the potass is to be preferred. When, however, the tumour is large, a part of the integuments covering it must be removed, otherwise a large cavity will be left, in which pus will accumulate. In this case, the base of the tumour is to be surrounded by two elliptical incisions, and the cyst dissected out entire, leaving only integument sufficient to cover the exposed surface. In the smaller tumours, it is vain to attempt regular dissection; a portion of the cyst will be left, and the disease reproduced: whereas, by using the potass, the operation is much more speedy, and always successful. The making a minute aperture, and squeezing out the contents, is at best but a palliative measure, and is often followed by severe constitutional disturbance.

## OF WOUNDS.

7

THESE are various, according to their extent, and the instrument by which they are inflicted. The violence attending the injury, and the nature and importance of the parts divided, or in the neighbourhood of the wound, must all be studied, for on these circumstances depend the accurate knowledge and judicious treatment of the case. Wounds have been divided into incised, punctured, and bruised; that is, inflicted by a sharp-edged, sharp-pointed, or an obtuse body. In the first kind, there is greater or less effusion of blood, according to the size and number of the vessels divided. Some extend but a little way beyond the subcutaneous cellular tissue, and are consequently attended with but slight bleeding; others penetrate to a greater depth, and occasion hæmorrhage, from a large vessel wounded, or other alarming symptoms, by having penetrated into an important organ; and others, though not of so great a depth as the former, may still, on account of their mere extent, be accompanied with very considerable loss of blood. It is seldom that fatal effects immediately follow external wounds; but they may, and do occur, when blood-vessels of the first class are cut. They are most likely to prove suddenly fatal when the arteries are only partially divided, and when these are accompanied with large veins. When the artery is cut through, its extremities retract, effusion takes place into the sheath, and compresses the orifice, and thus the for-

mation of a coagulum within the vessel is promoted, and the hæmorrhage arrested. But when a portion only of the circumference is divided, the blood continues to flow through the aperture, as if into a smaller ramification of itself, no retraction or contraction of the vessel can occur, coagulation is slow, and the bleeding profuse. I have seen a wound of so small a vessel as the internal mammary prove almost instantaneously fatal. Wounds of the large internal vessels for the most part prove instantly fatal; as wounds of the heart, or the large vessels passing to and from its cavities, at the root of the lungs, at the upper part of the liver, &c. When the heart, or these vessels, whilst within the pericardium, have been divided, it can be readily understood how life should be immediately destroyed, since the blood effused into the cavity of the pericardium by its pressure completely arrests the action of the heart. But occasionally punctured wounds, in such situations, have not been followed by instant death. In such cases, alarming symptoms occur at the time, but subside, and the patient may for some time suffer no uneasiness, but will afterwards expire suddenly during muscular exertion, or perhaps in a fit of violent passion. Blood must have been effused into the pericardium at the first, causing symptoms of, or actual syncope; but then the aperture in the vessel had become obstructed by coagulum before blood had been poured out in such quantity as to effectually prevent the actions of the heart; at a future period, the coagulum gives way, and the subsequent effusion is limited only by

the pericardial cavity being completely filled. In wounds, hæmorrhage is the symptom which most alarms the bystanders, and which demands immediate attention; but to operate successfully, the surgeon must divest himself of all fear, and learn to look boldly on the open mouths of arteries. Effusion of blood ceases spontaneously even from considerable vessels, on faintness supervening, and thus many lives are saved; but as soon as reaction commences, it generally recurs, and may prove fatal, unless proper measures be resorted to.

When an artery is divided, its extremity retracts within the sheath, contracts, and coagulation occurs; thus the orifice is obstructed, and a temporary barrier is formed to further hæmorrhage. The tube, however, is permanently closed by effusion of lymph from its orifice, and consolidation of the surrounding parts.

The circumstances which follow division of an artery, are these:—The immediate effect is retraction of its ends within the investing sheath, and a simultaneous contraction of the coats, so as to diminish the calibre. From the superior orifice, there is necessarily a profuse flow of blood, which is discharged through the sheath that formerly enclosed that part of the vessel which has retracted. After considerable effusion of blood, the flow becomes slower and less profuse; particles of blood adhere to those fibres which previously connected the artery to the sheath, but which were lacerated by the sudden retraction of the divided extremity; these particles coagulate, and lessen the canal through which the blood is dischar-

ged, whilst they present an irregular surface, on which the blood continues to be deposited and to coagulate; and thus the aperture in the sheath is ultimately closed. This external coagulum is found to commence at the extremity of the artery, where it is of a cylindrical form, and shuts up the mouth of the vessel; it then extends along the canal in the sheath, frequently assuming a conical form; and if a free discharge has been allowed for the blood, it will terminate at the cut margin of the sheath, otherwise it will be found continuous with the coagulum blocking up the external wound. Also, when hæmorrhage has been resisted by the shutting of the external wound, blood is infiltrated into the cellular tissue around the bleeding point, and there coagulates; but this circumstance can be productive of little or no pressure on the parietes of the vessel, so as to assist those other means which obstruct it. The flow of blood through the divided vessel being prevented, the circulating fluid necessarily passes through the nearest collateral branches, leaving the blood in the extremity of the larger trunk in a state of comparative rest; consequently, coagulation occurs in this situation. The internal coagulum, however, is small, and not sufficient to occupy completely the cavity of the vessel; it is of a conical form, its apex being towards the heart, and opposite to the first collateral branch, and its base resting on the external coagulum, and there adhering to the internal surface of the artery. But whilst this latter process is advancing, the capillary vessels supplying the cut margins of the artery



have begun to act; they throw out coagulating lymph, and continue to do so until their secretion has completely filled the vessel immediately opposite to its divided margins; thus a third and more effectual coagulum is formed,—one of lymph, situated between the external and internal coagula of blood, and in general closely adherent to them. Lymph is also effused externally to the artery and its sheath, forming a dense stratum, which separates the extremity of the vessel from the external wound; it becomes organized, forms granulations, and thus the parts are consolidated, and the wound cicatrized. When the artery is permanently obstructed by the adhesion of its cut margins, the external coagulum can be dispensed with, and is gradually absorbed. Afterwards all the newly formed parts are condensed, and diminish in size; the artery contracts, its internal surface finally embraces the coagulated blood which lay loose in its canal; its coats appear to be thickened, and it is firm and hard. Ultimately, in consequence of the continuance of absorption, it becomes much more attenuated, so as scarcely to differ from the surrounding cellular tissue. Similar changes occur in the lower extremity of the divided artery; in general it retracts farther, its orifice is more contracted, and, the flow of blood being much less profuse than in the superior, the natural means for its temporary closure are sooner accomplished. When an artery has been divided close to the origin of a collateral branch, no bloody coagulum can form internally, for the blood

in that situation is necessarily in a state of constant motion.

If the hæmorrhage is suppressed artificially, either by ligature, or by otherwise well-applied pressure, no external coagulum is formed ; there are only the internal bloody coagulum, and the lymphatic effusion and consolidation of the compressed part. The natural contraction and retraction cannot occur in vessels partially divided ; wherefore hæmorrhage is more violent and dangerous, from a partial than from a complete section. Again, transverse wounds are more dangerous than longitudinal ; in the latter, the edges of the wound are spontaneously approximated on account of the structure of the vessels, whilst, from the same cause, the margins of the latter continue separate, and, in fact, the aperture is a complete circle ; the lips of an oblique wound will be more or less apart, in proportion as it approaches to the transverse direction. When an artery has been punctured, the wound in the sheath does not correspond with that in the vessel ; blood, therefore, accumulates between the vessel and its sheath, and there coagulates. The wound is thus compressed, its edges kept in contact, and the farther escape of blood prevented ; the lips of the incision are then agglutinated by effused lymph, and cicatrisation occurs. This, however, cannot be expected to take place unless methodical pressure has been applied from the first. Even from small punctures blood is effused under the sheath and into the neighbouring cellular tissue, rapidly, and in such quantity as to prevent adhesion.

The effusion continues, and a false aneurism is formed. If a considerable part of the circumference has been divided, the lymph may be, and generally is, superabundant, and often to such an extent as to close up the canal of the artery at that point; but if the aperture is minute and in a longitudinal direction, lymph will seldom be effused in greater quantity than is sufficient for the cicatrisation, and though it should be superabundant, it is afterwards removed by the absorbents. In all cases, the cellular tissue round the wounded point is much thickened and condensed by the deposition of lymph, but this gradually disappears after cicatrisation has been completed. Sometimes, and generally when the wound has been transverse and large, the process of adhesion is disturbed, and suppuration occurs; in this case the wound in the vessel communicates with a fistulous track in the externally effused lymph, and may be the source of troublesome hæmorrhage. In other instances of extensive transverse wounds, the undivided slip ulcerates, and the artery becomes obliterated, by means of the same natural processes that occur in complete division. In cases of laceration of an artery, when its coats have been forcibly torn rather than divided, little or no bleeding takes place. The vessel retracts; the lacerated margins of its inner coat become puckered up, so as to greatly contract the orifice of the vessel; the sheath is lacerated, and presents a very irregular surface, on which portions of blood are retained and coagulate; in short, the immediate effects of the injury are such, as to cause

the speedy formation of coagula, by which the hæmorrhage is arrested until the orifices of the vessel be permanently closed by the adhesive process. Thus, in instances where the whole of an extremity has been torn off, the patients have lost but a very small quantity of blood.

From wounds of veins the blood flows, not in a subsaltatory, but in a uniform stream, its colour is dark, and the flow is easily suppressed. Placing a ligature on a vein is dangerous, and to be scrupulously avoided. The process of reparation, besides, in a wounded vein, is different from that in an artery. Veins are less disposed to the secreting action by which adhesion is perfected; and when inflamed, the inflammation is extremely apt to extend along the coats of the vessel; which latter circumstance has been ascribed to the great proportion of cellular tissue in their coats. When punctured longitudinally, the lips of the wound remain in contact, and cicatrisation, by means of effused lymph, is soon effected; in fact, the wound heals by the first intention. But if opened obliquely or transversely; not to a great extent, the immediate result is discharge of blood, and, when this has ceased, a coagulum forms in the wound, the margins of which remain separate; and this coagulum generally communicates with blood effused into the sheath of the vessel. After some time, the lips of the wound encircling the coagulum, which occupies the aperture, and which has temporarily averted the hæmorrhage, become somewhat turgid, and increased in vascularity; they then appear to assume a secreting action,

by which a membranous substance, of extreme delicacy, is produced; and the extent of this membrane is increased until it form an expansion, investing the outer surface of the clot; it then becomes thickened, by addition of matter similar to itself from the recent vessels which ramify in it. At the same time it forms adhesions to the surrounding cellular tissue, and resembles the original tunics of the vein. After being consolidated, so as to prevent the flow of blood through that part, the coagulum, formed to arrest the hæmorrhage, until a more complete barrier should be procured, is gradually absorbed. But the membrane long remains smooth, thin, and diaphanous, and can be thereby readily distinguished from the original coats. This reparative process is much longer in being finished than the corresponding one in arteries; and from what has been stated, it is evident that the two actions differ in other respects than the time requisite. When a vein has been completely divided, the extremities are closed by means similar to those which have been already detailed in regard to arteries.

In many, nay in most, instances of hæmorrhage from a wounded artery, the surgeon cannot wait for the natural processes by which the flow of blood is arrested, but must have recourse to immediate and certain means. In division of the smaller arteries, or in minute wounds of the larger, pressure, well applied, will often be sufficient. In both cases it immediately stops the flow: in the former, it prevents the blood from penetrating into that portion

of the sheath which has been vacated by the retracted artery ; and it being thereby confined, and kept in a state of rest, coagulation soon takes place. At the same time, the compression brings the divided margins of the vessel into close apposition, and thereby permanent closure, by adhesion, is quickly accomplished. In the latter, the mere circumstance of the escape of blood being prevented, naturally hastens the closure of the minute aperture by the natural process ; and if the compression be severe, the opposite surfaces of the vessel, being brought in contact, may adhere, and the canal be obliterated at the wounded point. It is obvious, that in this latter class, pressure can only be of advantage immediately after the infliction of the wound, and not when blood is extravasated to a great extent.

Pressure may be used along with styptics, or along with escharotics, actual or potential. They may be often employed when pressure ought not ; styptics promote the contraction and retraction of the divided extremities, and thereby expedite the formation of a coagulum. Escharotics form an eschar, which, adhering to the extremity of the vessel, stops the flow of blood, and the cut margins of the vessel, being stimulated by the application, soon cohere. Not unfrequently after the separation of the slough, union has not taken place, and the hæmorrhage is renewed ; and, from this circumstance, the remedy cannot be trusted to except when the divided vessels or vessel are of small size. It may be stated, generally, that these means are of little avail without methodical

pressure. In oozing from small vessels, pressure may be applied by means of agaric, sponge, lint, &c. But in wounds of the larger vessels, the most efficient mean is a graduated compress of lint placed immediately on the external wound, and supported by a firmly applied bandage. The bandage ought to encircle not only the wounded part, but every part of the limb with a uniform tightness, not so great as to arrest the circulation; the parts are thereby supported, and engorgement prevented. This method, when employed previously to the effusion of much blood into the cellular tissue, has proved effectual in wounds even of the brachial, femoral, and carotid arteries. When blood has been extensively injected into the limb, when the aperture in the vessel has remained pervious, and when a large diffused aneurism exists, bandaging is worse than useless. By its application in such a case the limb becomes discoloured, and swells extensively; there is a risk of mortification from impeded circulation. If a small quantity only of blood has escaped, its diffusion and increase may be prevented by the bandage: but a cyst will nevertheless be formed in the cellular tissue; its parietes will communicate with the margins of the aperture in the artery, its cavity with the canal of the vessel; an aneurism of the false kind will be established, and will run the course of one arising spontaneously.

A ligature, well applied, is the only means that can be relied on. The immediate effect of a tightly drawn ligature is to avert the flow of blood, to divide the internal and middle coats at the deligated point,

the cellular coat remaining entire, and to narrow the canal for some extent above the point at which it is applied. Coagulation then occurs within the vessel above the ligature, provided there is no collateral branch in the immediate vicinity. The ruptured margins of the internal coat effuse lymph and cohere; lymph is effused in the cellular tissue, exterior to the artery and to the ligature; by the compression of the ligature, ulceration occurs in those parts which it envelopes, and it is discharged; but before this, the canal of the vessel has been obliterated by an internal coagulum, and by the effused lymph. Afterwards, the same absorption and consolidation occur, as in a divided artery, the orifice of which has closed permanently and spontaneously.

When from a punctured wound profuse hæmorrhage ensues, there is reason to suspect that an important vessel has been hurt, and the bleeding point must be sought for. After the artery giving out the blood has been discovered, the external wound must be enlarged, so as to expose the vessel, and admit of the convenient application of a ligature. It will not be sufficient to include the vessel above the wounded point, for the lower part will, after some time, be supplied with blood by the collateral branches, almost as freely as by the large trunk, and, consequently, bleeding will be renewed. Two ligatures are to be employed, one above, the other below the wound. The wounded vessel must be exposed, as already stated, but not detached more than is sufficient for the application of the ligature; and at the same time, the



ligature ought to inclose nothing but the vessel. Neither ought the ligatures to be placed at any considerable distance, but as close to the wounded point as possible; otherwise, circulation in the included part may be restored. The ligature, round, narrow, firm, ought to be tightly applied. Cases of hæmorrhage have occurred, in which the tying of the vessel immediately above the wound has been successful; but these are few, and by no means afford any argument for the adoption of such a measure. If the vessel is merely punctured, it is necessary to apply the ligature by means of a needle, and the parts are to be disturbed as little as possible. If, however, the artery is completely divided, its cut extremities are to be drawn out of their sheath, and the ligatures applied close to the connexions of the vessel; the vasa vasorum, in the immediate vicinity of the deligated point, being left to carry on those processes by which obliteration is accomplished. The instrument which will generally be found most useful for laying hold of the vessel, is the common dissecting forceps, but a hook will, in certain circumstances, be more convenient. Hæmorrhage from the small vessels soon ceases; and before re-action occurs, their orifices have generally become so obstructed as to resist the effusion of blood.

The effects of ligature on a vein are somewhat different from those on an artery. The inner coat of the former is more dense and elastic, and remains entire, whilst the external and middle are divided. It is puckered by the ligature, and its opposite sur-

faces are placed in immediate contact; but there is no breach of surface, and adhesion does not occur till the tunic has been divided by ulceration; then the opposite margins cohere, the vessel is obliterated, and undergoes changes resembling those in an artery similarly circumstanced. The coagulum between the ligature and extremity is of considerable extent, dense, and completely filling the canal of the vein, and consequently, of a cylindrical form.

The edges of the wound, in the soft parts, ought not to be approximated till the bleeding have entirely ceased, and the surface become glazed, for the interposition of a quantity of blood prevents union by the first intention. When bleeding has ceased, its edges are to be brought together as accurately as possible, and adhesion promoted. The minute vessels assume an action greater than in the healthy, though not equal to the inflammatory; they effuse coagulating lymph, by which the opposed surfaces are agglutinated, though the union is at first feeble and easily broken up. Soon the lymph is firmly attached, by newly formed vessels, to the surface from which it was secreted; in effect, it becomes organized, and rendered capable of undergoing, through its inherent powers, the changes necessary for its perfection and stability. Similar processes go on in it as in any sound part of the body; new matter is deposited, and the superfluous is absorbed. Nutrition, however, is not the same in all parts of its substance, that is, the new matter deposited is not exactly similar at all points; but according as the new secreting vessels

proceed from the different tissues, of which the margins of the recent wound are composed ; so, in various parts of the new formation, these vessels assume peculiar modes of action, one set forming muscles, another cellular tissue, a third skin, &c., formations corresponding to the primary tissues from which the secreting vessels proceed.

Thus the *vasa vasorum*, ramifying on the divided ends of the minute vessels, secrete a substance which is transformed into a set of minute capillaries, and these also, assuming a secretive action, produce an arterial, or venous tube, similar to that nourished by the original *vasa vasorum* ; by this process, the lymph becomes well supplied with blood-vessels, those from the opposite surfaces meeting, and freely inosculating with each other. These blood-vessels, as already stated, have been produced from arteries possessing different powers, and hence the newly formed assume actions similar to those of the primary, and thereby interstitial matter is deposited of its proper kind and in its proper place, a cuticular membrane superficially, then cellular tissue, afterwards muscle, and so on according to the primary tissues which had been divided ; these parts do not at first resemble exactly the corresponding natural tissues, but by the continued action of the new vessels, they are moulded and prepared for the due performance of their respective functions. If the degree of action necessary for the accomplishment of these processes increase to inflammation, adhesion is interrupted till the action be lowered to its previous standard. From

this view it is evident, that, besides a certain excitement of the blood-vessels, it is necessary that the raw margins be in close apposition, and carefully retained so, for, by ever so slight movement of the parts, the recent and delicate bond of union will be ruptured ; and if this motion be allowed to continue, adhesion may be at divers times begun, but can never be perfected. Whereas, if the necessary precautions are adopted, union is often completed in thirty or forty hours, sometimes sooner, seldom later ; and from a knowledge of the astonishing powers of nature in repairing injuries, many and important additions have accrued to the science of surgery. In the majority of instances, it is also requisite that the parts be brought in contact soon after division, otherwise granulation will have commenced in the different parts of the wound, and the surfaces then approximated will not so readily adhere ; pus is formed, and having lodged between the surfaces, acts as an extraneous substance, keeping them apart, and separating them still farther by its accumulation. All foreign bodies in the wound must be removed before adhesion can occur ; and on the same principle, care ought to be taken that no effused blood be interposed. In many cases the margins of the wound can be accurately adjusted by careful attention to the position of the part, or by the application of a few strips of adhesive plaster ; but the latter, from indiscriminate use, often prove the source of much irritation, and totally frustrate the end for which they are designed. When employed, they ought to be narrow and few.

If such means be considered insufficient, recourse must be had to a few points of interrupted suture, and these are destitute of many of the faults which have been by some attributed to them. When neatly applied, they can produce but little irritation, more especially if removed as soon as their presence is unnecessary, that is, as soon as adhesion has fairly commenced, and the natural bond of union is of such strength as to need no artificial assistance; by these the edges of the wound are more neatly and suitably placed than by any other means; they meet easily, without the puckering or overlapping of each other; and from the circumstance of sutures obtaining a more just coaptation, they can be sooner discontinued. In most wounds no other dressing is required; but in some a combination of sutures, adhesive plaster, and compress, is necessary.

Of late, I have greatly dispensed with stitches and the common adhesive plaster, using, instead of the latter, slips of glazed ribbon smeared with a saturated solution of isinglass in brandy, which is much less irritating and more tenacious than the common adhesive compost. The parts are fixed temporarily with a single stitch, or two at most, and cloths dipped in cold water are placed over the wound; the ribbons are not applied till the adhesive substance have partly congealed, and the oozing of blood ceased. The divided margins being approximated by the fingers of an assistant, the ribbons are laid gently over, and held for a few seconds. After a sufficient

number have been applied, the stitches are withdrawn, being no longer necessary. No other dressing is required unless suppuration occur; the ribbons will adhere firmly till the completion of the cure, and thus the pain and irritation caused by frequent dressing is avoided. Even the largest wounds, as after amputation, are treated in this manner, with the most satisfactory results.

If at any part adhesion fail, suppuration and granulation must follow. The adhesion may be prevented by any of the circumstances already mentioned, or by an unfavourable state of the constitution, the nature of the wound, exposure to bad air, the occurrence of fever, or of a flux natural or not. The wound may contain foreign matter, blood or the contents of canals may be effused into it, and many other obstacles may exist to retard, or prevent adhesion. Notwithstanding, in all cases, though the chance of union be but small, the parts should be approximated. A great point is gained if certain parts only are brought to adhere, for by their natural attachments the opposite surfaces are preserved in more direct contact than they could otherwise be, and thereby but little space remains to be filled up with granulations. If, on the contrary, the surfaces are not approximated, the flap is diminished in size, and when afterwards placed in contact with the surface from which it was detached, it is found not to correspond, leaving considerable deficiency to be repaired by the comparatively slow process of granulation. Whereas, if it had been early replaced, par-

tial attachments would have been formed by adhesion, the flap thereby retained in situ, and but little new matter required.

Sometimes union does occur, and that speedily, after the flap has remained separate for a considerable time; and in such cases it may be doubted, whether union is accomplished by adhesion, strictly so called, or by granulation. Most probably it is by the former of these processes that the rapid union occurs in such circumstances; the divided parts have assumed an excited action, and effused lymph; and during their state of separation, the lymph will become organized when it is connected with the original parts, just as well as if the surfaces had been in contact; and when they are at length so placed, they will be agglutinated to each other by the outer part of the effused lymph, which still continues soft and unorganized. If motion be then prevented, organization, which has already commenced in the connecting medium, will proceed undisturbed, converting the agglutination of soft inorganized lymph into firm and permanent union by means of organized tissue. In these circumstances, it is not to be wondered at, if adhesion should be completed in a shorter time than when the surfaces are brought together immediately after their division; in each instance the process is the same, only in the one it has to proceed from its very commencement, whilst in the other it is previously all but perfected, and after the parts have been put together, the last stage only requires completion. If, however, the parts remain separate until the effu-

sed lymph be fully organized, and converted into a secreting surface, adhesion will not go on when they are placed in contact ; but the organized lymph will deposit matter similar to itself, and pus will also be secreted ; in fine, the wound will heal by granulation, and the union will not be so rapid as in the former instance.

If union by the first intention does not take place, then all the applications to procure it must be abandoned, all sutures, plasters, compresses, &c. must be dismissed, for they now can do no good, and may be productive of harm ; the attention, on the contrary, must be directed to effecting union by granulation ; with this view, other means are to be chosen, so that to continue those which were formerly used to promote adhesion would be absurd, when adhesion can no longer be expected. The stitches must then be taken out ; when inflammation has gone off, and œdema remains, the parts are to be supported ; and by attention to position, and gentle bandaging, the size of the wound will be diminished. Inflammation must be subdued by the usual means, and suppuration encouraged by fomentation and poulticing. After inflammation has subsided, tension disappeared, purulent discharge occurred, and granulations formed, the edges of the wound are to be gently brought together, so as to render the quantity of new matter requisite for filling up the cavity as small as possible. Nature will then accomplish the union in her own way, and we can only assist and minister to her ; for who thinks now of healing wounds by



pure force of surgery? The dressings ought to be light, the ointment scanty; in some cases they may be dry; but in many, various lotions will be found of much advantage. These latter are used of different qualities, according to the nature of the sore; and it ought to be known, that they can be of little avail unless evaporation be prevented, by a piece of oil-silk laid on the outer surface of the dressing. In most granulating wounds they require to be of a mildly stimulating nature, and the one which I have most extensively employed is a weak solution of the sulphas zinci. The integuments round the wound may be occasionally washed, to prevent excoriation, but no good can accrue from washing the sore; its natural discharge is its best protection, and if superabundant, it can be removed by means of dry lint or tow.

From *Bruised* wounds there is little or no hæmorrhage, but in proportion to the severity of the bruise, are the pain and bleeding slight, and the danger great. The blood-vessels are so torn and twisted as to permit the spontaneous and temporary suppression of hæmorrhage to occur almost immediately; and the larger arteries may escape entirely, owing to their elasticity. Sometimes after bruised wounds, such as those inflicted by gunshot, the large vessels bleed instantly and violently; often, however, hæmorrhage occurs only after the sloughs separate, many days after the infliction of the injury, and then it is generally very profuse; in some instances, limbs are torn, bruised, or shot away, without hæmorrhage occurring to any great degree, or at any period. Frequently the vi-

tality of the parts surrounding the wound is much diminished; and the whole limb is apt to become gangrenous, either immediately, on account of the extreme violence of the injury, or consecutively, from greatly excited action going on in parts whose power of resistance has been much impaired. In the treatment of bruised wounds, the position of the parts must be carefully attended to; they must be placed in a state of relaxation. In general, it is unnecessary to retain the margins of the wound in contact, for adhesion cannot occur—suppuration must ensue, and is to be desired—and the dead and dying parts must be loosened and discharged before union can take place. Sometimes, as when a large flap has been detached, and the parts not much injured otherwise, approximation ought to be accomplished, for the reasons already mentioned. In almost all cases, and most certainly in those in which the mechanical injury has been severe, and its effects extensive, violent inflammatory action is to be dreaded, and measures must be taken to avoid it: often, notwithstanding the prophylactic treatment, violent inflammation comes on, and then recourse must be had to the means proper for the subduing of it. Blood is to be taken from the part, if necessary, and cooling applications used, in the form of poultice, or lotion. The main indication is, to prevent extravasation into the substance of the limb, and strongly excited action. When the sloughs begin to separate, emollient poultices promote the suppuration and discharge of dead matter, and afterwards the sore must be dressed, according to the

nature of the case, with the applications most fit for granulating sores in their different degrees of action and advancement. During the after treatment, the sides of the sore ought to be well supported, so as to prevent, as much as possible, suppuration from extending along the neighbouring cellular tissue; but, at the same time, the dressing must not be so tight as to cause irritation. When abscesses have formed in the neighbourhood, the cavities must be freely exposed by incision; thus a free discharge will be given to the matter, and the cavity brought to granulate from the bottom. During the suppurating stage, the patient's strength must be maintained by generous diet.

*Punctured* wounds are dangerous, from the deep and internal effusion of blood and serum which usually attends them. The effusion, which in open wounds is poured out externally, and moderates and prevents the excited action from exceeding what is salutary, is, in punctured wounds, poured into the substance of the limb to its detriment. It is followed by severe inflammatory action and profuse suppuration. In order to prevent these untoward results, it was formerly the practice immediately to dilate the wound; but this is hurtful, for if the wound be deep, as it generally is, dilatation of its whole extent is a proceeding severe in itself, and in its consequences; whilst, if the external part only of the wound is dilated, the operation will entirely fail to effect what is intended. The knife will be used in ~~great~~ good time where a foreign body is lodged in the wound, when tension has occurred, or

matter has formed. Sometimes the wound heals throughout its whole tract by adhesion, without any bad symptoms being so much as threatened. Setons, recommended in this class of wounds, are of no service. It is not the narrowness of the external opening, as is supposed, that is the cause of all the mischief, but the bruising of deep-seated parts, and subsequent effusion into them.

When a wound is to heal by granulation, the exposed surface at first is dry, painful, and slightly swelled, and afterwards a thin discharge of bloody serum is poured out, with relief to the painful sensations; the surface is at this time covered by a thin layer of coagulated lymph, and the parts, if approximated, are in the most favourable state for adhesion. Soon, however, the vessels assume a different mode of action, and secrete a fluid which, after exposure to the air, becomes purulent; the effused lymph has been organized, forms a living part of the surface from which it was deposited, and is covered and protected, in its yet delicate condition, by the purulent fluid. This new matter is disposed in numerous small conical projections of a florid colour; and these, by their own power, form others similar to themselves, at the same time discharging purulent matter; so that, in a healthy constitution, the cavity is soon filled by the granulations, which come to the same level as the surrounding integument. Sometimes they are exuberant, soft, and spongy, and in this state possessed of little sensibility, and but ill supplied with blood-vessels. At others, they are slow in approaching the

surface, and then often morbidly sensible. In all cases, the new matter is very apt to be absorbed, either from the state of the patient's health, or from the nature of the applications ; and foreign substances in a state of solution or minute division are more readily taken into the system from the raw surface than from the sound skin. When, then, the granulations approach the skin, the sore contracts, the newly formed parts being modelled into a more firm and dense condition by the action of the absorbents. Sometimes, in superficial sores, the skin is seen spreading from several parts near the centre ; but at these points portions of the original skin must have remained uninjured, though the others were destroyed, and have formed cutaneous matter as soon as they were on the same level with the surrounding granulations ; for these insulated portions of skin are not a product of granulations, as some suppose, but of a substance similar to themselves. Skin is formed from skin. Thus, where a part of the integuments has been completely removed by operation, or destroyed by accident, no islands of skin are observed during the cure, but the sore is uniformly covered by skin proceeding from its margins. The margins of a healing sore are of a white colour, and adherent to the subjacent parts ; but in an unhealthy one the margins are often unsupported, the subjacent granulations are absorbed, and their place is occupied by thin purulent matter ; the new skin is unable to retain its independent existence, becomes of a dark colour, and sloughs. The recent cutaneous matter covering a sore contracts,

and the neighbouring old skin is extended ; the new surface is thus diminished ; it assumes a slightly puckered appearance, and is termed cicatrix. Frequently it is so far absorbed after some time, as to leave only a firm line, whiter and more dense than the surrounding integument.

*Poisoned* wounds are rare in this country. Wounds by the stings of certain trifling insects produce considerable swelling in some constitutions, and when the injury has been inflicted on a loose texture. In some parts of this country the bite of a small adder causes pain, swelling, and unhealthy suppuration of the part, with some constitutional disturbance, but the results are seldom serious, and never fatal. In warmer climates the bites of some snakes are followed by the most violent symptoms ; in some cases proving fatal in a few hours, in others after a day or two. Great swelling occurs almost immediately, attended with excruciating pain, and extends upward in the limb ; vision becomes impaired, the patient lies in a state of stupor, and ultimately succumbs under convulsions and delirium ; the symptoms vary in particular instances according to idiosyncrasies and the state of the constitution when the injury is inflicted. In this country the bites of rabid animals are more dangerous than those of animals naturally poisonous. Rabies most frequently occurs in dogs, and others of that species, such as wolves, foxes, &c. They become dull, sluggish, and irritable, have unnatural appetites and cravings, devouring their excrement and urine. Derangement of the cerebral functions

is not complete,—they know and obey their master. They are often not afraid of water, but lap it and go into it readily. From them the disease is communicated to the human subject, and to the lower animals, such as cats, sheep, cattle, and even fowls; the virus is not communicable, except by the deposition of the saliva on an abraded surface, or into a wound. It is not produced by eating the flesh of a rabid animal. During the first days of the attack pustules are observed under the tongue, but no apparent change in the glands. The symptoms of hydrophobia in man seldom appear before the twentieth day after the infliction of the wound, and in some instances they have not presented themselves till after the lapse of months. The most prominent are great restlessness, much irritability and anxiety, and convulsions of the muscles concerned in deglutition, produced either by attempts to swallow, or by fluid being presented to the patient. Ultimately the spasms become general, are induced by the most trifling exertions or noises, and prove fatal in a few days. Frequently the patient retains his senses throughout, and is fully aware of his lamentable situation; in other instances he soon becomes delirious, raves, and threatens his attendants. For this horrible disease we are unacquainted with any cure. In general profuse bleedings are employed, and large quantities of opium given internally; every powerful anti-spasmodic, as well as every violent medicine, has been made trial of, but in vain; some certainly mitigate the symptoms, but none cure the patient. The morbid

appearances usually observed after death are marks of inflammation of the pharynx and air passages, and of the mucous surface of the stomach and intestines. It is evident that the disease ought to be prevented if possible, and for its prevention the most efficient measure is timely excision of the affected parts; when excision is dangerous, or wholly impracticable, and when the patient does not apply soon after the accident, the injured parts may be destroyed by potass. The removal of parts wounded by snakes, even after violent symptoms have appeared, has proved successful, ammonia having been at the same time administered internally. In some instances arsenic has been found efficacious when given in large doses, and frequently repeated.

Wounds received during dissection occasionally have unpleasant consequences from the absorption of putrid animal matter. The absorbents leading from the wounded part become swelled and painful, and in slight cases there are shivering and general indisposition for some days. The more violent symptoms arise from examining bodies which are rather recent, and in which putrefaction is just commencing, and very frequently from inspecting the bodies of females who have died of puerperal diseases. The absorption may take place from punctures made by scissors, the point of a knife, or spiculæ of bone, or from old scratches, or chops by the side of the nail or on the hand. There is little or no danger from an open and bleeding wound, as by the flow of blood the part is completely cleaned; it is only from slight punctures



that untoward symptoms need be apprehended. Effects similar to those resulting from wounds in dissection often occur in nurses and others who have pricked themselves with pins while washing foul clothes. The symptoms already mentioned are soon followed by others more severe : shivering continues, and the patient is seized with vomiting ; the part affected, and often the greater part of the arm, become red and much swollen, and the cellular tissue is infiltrated with serum ; abscesses form at various points, often in the axilla, and purulent matter is diffused throughout the unhealthy cellular tissue, which in many instances sloughs, and gives rise to extensive sores. Typhoid symptoms soon appear, and in the more aggravated cases speedily prove fatal. When such local and constitutional symptoms arise, it will generally be found that the patient was of a broken-up constitution previously to the infliction of the wound ; did they solely depend on the inoculation of virus, they would be of very common occurrence, considering that wounds are so frequently received during dissection ; but it is seldom that any unpleasant symptoms follow such an accident. In all cases, however, it is prudent to adopt measures in order to prevent absorption of the virus. With this view the wound is made to bleed by means of pressure or suction, and by the latter method the exposed surface is most effectually purified ; afterwards nitrate of silver may be applied to deaden the surface, and protect it by an eschar. If such means be unavailing, the after symptoms must be encountered as they appear, local

inflammation subdued, tension relieved, abscesses opened, sloughs removed, &c. General bleeding is seldom admissible, but purgatives and antimonials will prove beneficial at the commencement; afterwards the strength is to be supported, and, if the patient be much reduced, stimulants are to be liberally administered.

We shall next treat briefly of *Gunshot* wounds; under this head are included the contused and the lacerated, caused by splinters, &c. The vitality of the injured surface is generally destroyed at once, whence bleeding seldom occurs, even after whole limbs have been shot away; in some cases, hæmorrhage is profuse, as when a large artery has been wounded by small shot. The effects on the system are extremely various; some persons are affected with tremors, anxiety, and depression from slight wounds; while the most severe injuries are often unaccompanied with any disturbance of the nerves. The shock is generally of short duration, disappearing soon, on the patient's being reassured and encouraged, or after his taking a little wine or opium. In gunshot wounds, those inflicted from a distance and close at hand can in general be readily distinguished. In the latter the wound is large and lacerated, portions of the wadding are impacted, and the skin around is marked with grains of gunpowder. In the former, the wound is small and clean. When a ball passes through a fleshy part, the opening at its entrance is small and depressed; whilst that by which it escaped is open, with everted edges. When

it follows a superficial course, its track is marked by a wheal, or elevation of the skin with discoloration. At one time, it was believed that the most serious consequences resulted from a ball passing close past the body, and without touching it—that in this way violent concussion of the brain, proving instantly fatal, was produced; but this notion has been disproved by experience; part of the head accoutrements, of the hair, of the nose, and of the ears, have been shot away by cannon-balls, and yet no disturbance of the brain has followed either immediately or consecutively. The opinion originated from the circumstance of soldiers having been found dead without any evidence of injury; but bones are often broken and comminuted by an indirect blow, or by a spent ball, without any breach of surface or external sign remaining; internal injuries indeed—rupture of viscera—more than sufficient to cause instant death, are thus inflicted without any apparent external læsion.

The course of a ball in the body is often very strange, depending on the force with which it is projected, or the resistance which is opposed to it, and on the position of the struck part. Balls often pass almost completely round the head or chest, having first struck the bone at a very oblique angle. Frequently they remain, lodged along with part of the clothing which they thrust before them. In such cases, they may be immediately removed, their exact situation being previously ascertained by external examination, or by means of a probe. They can generally be extracted through the aperture by which

they entered ; but if situated superficially, and at a distance from the opening, this will be more readily accomplished through an incision made upon them ; if allowed to remain, suppuration will occur in the neighbourhood, the surrounding cellular tissue will be condensed, an abscess will be formed containing the foreign body, and by the process of absorption proceeding in the parts external to the abscess, the ball will at last reach the surface, and be discharged. The track is often so extremely tortuous, as to render it impossible to ascertain the situation, or even the existence of the foreign body, which greatly impedes the operation ; and, in other instances, it may be necessary to allow the ball to remain undisturbed, on account of its being placed near important parts, which might be injured by any attempt at removal. Foreign bodies often remain lodged in muscular parts for years, having become enveloped in a dense cyst, and having ceased to produce any great irritation. In consequence of the force with which they have been projected, and the resistance which has been opposed to their progress in the body, balls, when extracted, either immediately after the infliction of the injury, or after a considerable time has elapsed, are seldom found to retain their globular form, but are flattened and ragged, and not unfrequently completely divided by the bones on which they have impinged. A bullet may be divided into numerous fragments on a bone, and part may enter into the osseous substance, whilst other portions penetrate in all directions into the soft parts, and, though sharp and irregular, may remain

long in the dense cellular cyst which forms over them, without producing pain or inconvenience.

Besides, the bones are often splintered by the force with which they are struck, and loose portions of them lodge amongst the muscles; then they are the cause of much mischief, for, on account of their long, sharp, and irregular form, they occasion great irritation, suppuration ensues in various parts, sinuses form, and the cure is rendered very tedious. In other cases, the bone is split in a longitudinal direction, and, in the cylindrical bones, these fissures are often of great extent.

Considering the nature of the body which inflicts the injury in a gunshot wound, and the force with which it is impelled, it is evident that the cure must be in all cases tedious, in consequence of the sloughing and suppuration which is induced, particularly at the apertures through which the ball passed. The foreign body ought always to be removed as early as possible, provided it can be accomplished without much violence, or injury to the parts. Dilatation of gunshot wounds is now had recourse to only to facilitate the removal of balls, splinters, &c., and even with this view, it ought to be employed but to a very slight extent, if at all; for foreign substances, when deeply seated, can be much more easily taken out when the sloughs are separating, and the parts relaxed by suppuration; then, too, they can be more readily reached through a counter-opening, when their situation renders this expedient. In short, the surgeon is not justified in cutting for balls, unless

they are easily felt, and not deeply lodged. In order to discover the foreign body, probes will be necessary, and of these, the finger is the best, unless when the wound is of considerable depth; if, on examination, the ball cannot be discovered, and if there is reason to think it has followed an indirect course, the surgeon will, sometimes, be assisted in his diagnosis, by placing the patient in that position in which he received the wound, and then judging of the circumstances most likely to affect the foreign body in its course. In many cases, extraction can be accomplished by means of the finger alone; in others, forceps and scoops, various in length and size, are indispensable. Afterwards, light dressings are to be employed; and in the first instance, cold applications may prove advantageous in subduing the inflammatory action; but when suppuration has commenced, warm fomentations and poultices are to be preferred, which will in many cases be both more grateful to the patient, and more beneficial in their results, when used even from the commencement. Afterwards, it will be necessary to afford sufficient support to the parts by bandaging, and to change the applications according to the particular circumstances;—soothing, if the wound be irritable, stimulating, if inert, and gently escharotic, if the granulations be exuberant.

In severe injuries of the limbs, the surgeon must be guided by the state of the part, and of the constitution, by the circumstances in which he is placed, as to accommodation, and mode of transportation, &c.,

in deciding on the removal of the part by amputation, —or on making an attempt to save it, by trusting to, and assisting, the processes of nature. The question whether to amputate immediately, and on the spot, merely allowing the shock, if any exist, to pass away, or to delay till suppuration occur, is now scarcely a matter of dispute. When it is evident, from the extent, violence, and nature of the injury, that there is danger of speedy mortification, or of extensive and severe inflammation and suppuration, amputation is to be instantly performed,—delay is inadmissible. In comminution of the hard, with contusion and laceration of the soft parts—where limbs have been shattered and completely detached, or nearly so—in lacerations of parts, including the principal blood-vessels and nerves—fractures of the heads of bones, with openings into the joints—and in bad compound fractures, more especially of the thigh, (for all compound fractures of the upper part of the thigh are dangerous,) amputate at once. When the limb has been retained, and gangrene arises in consequence of the external injury, and not from an internal cause; or when the violence of inflammatory action has subsided, and the patient is become hectic, with profuse purulent discharge, and with disunited bones, then amputate. But in this latter case, the chance of recovery is not great, and the proportion of resources very small; whereas, in the immediate or primary operations, the very reverse holds true. Such is the experience of military surgeons. In civil practice, the results are different; a

greater proportion of primary amputations are unsuccessful, and the secondary turn out more favourably than the statements of military surgeons would lead one to believe. In all cases, the judgment of the surgeon must guide him in his determination. The circumstances of the case, and the probable contingencies, must be all duly considered, and he must not proceed with his knife where there exists even a slight chance of preserving the limb.

Paralysis occasionally follows wounds of the arm, fore-arm, face, &c. inflicted by accident or operation, and this arises from an important nerve, or set of nerves, being divided or punctured. In cases of simple division, without much separation of the parts, reunion of the nerves may take place, and their functions be restored. If the limb remains paralysed, after cicatrisation of the wound, tepid effusions, friction, either dry or with liniment, stimulating applications, &c., may be advantageous.

#### TETANUS

Is a disease which occasionally follows a wound, but rarely in this country. It is a spasmodic contraction, with rigidity, of the voluntary muscles, in some cases involving the whole body, in others the upper part of it only, and in some it is confined to a certain class of muscles. When the extensors are affected, the disease is termed *opisthotonos*; when the flexors, *emprosthotonos*. Complete tetanus is said to exist when the flexor



and extensor muscles exactly balance each other, and the body is thereby kept straight and rigid. But when the affection is confined to the muscles of deglutition, and chiefly to those moving the lower jaw, it is called trismus. The disease has besides been divided into acute and chronic, and into traumatic and idiopathic; of these, the latter is the more useful division—the one following wounds, the other arising from internal causes, or circumstances not connected with the læsion of the surface. The disease supervenes at various periods; sometimes, though rarely, immediately on the infliction, in other instances after the lapse of eight or ten days, and often when the wound is healing, or nearly cicatrized. In warm climates, where it is of very frequent occurrence, it occasionally seems to be caused by exposure to damp and changeable weather; in children, it supervenes on the slightest irritation or excoriation. It is often induced by the presence of splinters, or other bodies of an irritating nature, and by the partial division of nerves. Not unfrequently it occurs after clean wounds, as amputation or venesection; in the former it may arise from a nerve being included in the same ligature with an artery, in the latter, from a nervous twig being partially divided. The more prominent symptoms are: Stiffness of the back of the neck, and contraction of the features; difficult deglutition, and the efforts to accomplish it attended with violent spasms of the muscles of the pharynx and œsophagus; the muscles of the lower jaw rigid, and spasmodically contracted, and by a continuance and increase of the spasmodic

action, the mouth at last completely and immovably shut. The muscles of the trunk and limbs become affected, and there are violent spasms of particular sets of them, most generally of those situated posteriorly; thus the body is bent violently backward, so that its whole weight is supported on two points only, the heels and the occiput. These symptoms are not constant; relaxation occurs, and the patient enjoys a cessation of the malady: but this is only temporary; the painful feelings and the spasms soon return. A symptom of the most distressing nature is pain and spasmodic twitching of the diaphragm, impeding respiration, and imparting a shock to the whole system. Occasionally emprostotonos occurs, but the body is much more frequently bent backward; the muscles are sometimes ruptured by the violence of their own action. The circulating system and sensorial functions are often not much disturbed; but during the whole course of the disease, the bowels are much constipated. In most cases of traumatic tetanus, after four or five days, all the symptoms become aggravated; the countenance is horribly distorted, the spasms of the diaphragm are more frequent and violent, and the patient dies convulsed. Sometimes, though rarely, the fatal termination does not take place till the eighteenth or twentieth day. On dissection, the pharynx is found contracted, and bearing marks of acute inflammation. In one case, which fell under my observation, there was ultimately great difficulty in breathing and expectorating; and on examination, the trachea, as well as the pharynx, bore evident marks of

inflammation, and was filled with a viscid mucus. In some instances there are evident marks of inflammation of the spinal chord ; the vessels, more especially at the lower part, are found enlarged, tortuous, and engorged with blood ; portions of lymph are seen deposited on the arachnoid covering, and a serous fluid is effused, not unfrequently mixed with blood. Such appearances, however, are not observed in every case of fatal tetanus, and therefore it cannot be asserted as a fact, that the disease is dependent on a morbid condition of the spinal chord, though in certain cases the two affections co-exist. By some it has been supposed, that in consequence of the distended and engorged state of the spinal arteries, the origins of the nerves are stimulated, and that a morbid affection of them ensues, giving rise to the tetanic symptoms ; but want of uniformity in the morbid appearances prevents such a cause from being generally received as the origin of tetanus.

This disease is one of the most intractable with which the surgeon has to contend. In the acute form, time is scarcely allowed for remedies ; and in the advanced stage, it is with much difficulty that medicine can be received internally. Of course all irritations must be removed, both local and general, as far as that can be accomplished. If the patient be robust, and if the tetanic symptoms be ushered in with arterial incitement, general depletion ought certainly to be practised ; and if the symptoms be such as to render the propriety of general bleeding dubious, blood may be abstracted locally, from the back of the head, or

along the spine. At the same time, powerful purgatives must be given, so as to bring the bowels into a better state; for, as already observed, obstinate constipation is a constant attendant on this disease. But the most important indication is to alleviate and prevent, if possible, the spasms; and for this purpose, opium is to be administered in large doses, either by itself, or combined with camphor or other antispasmodics. By such means, the disease has in some cases been arrested, but in many others it has proceeded unabated; and this circumstance has led to the use of many pretended remedies. Some employ cold affusion and immersion, whilst others prefer the warm bath; and the latter appears to be the safer application, though neither can be considered as efficacious. Some use mercurial frictions along the spine, or on any part of the surface; while others administer stimulants, and enemata with tobacco and turpentine. When there is reason to apprehend that the symptoms arise in consequence of laceration or partial division of a nervous trunk, it has been recommended to complete the division of it; and the practice is worthy of adoption, as in some cases it appears to have been successful. Little good can result from scarification of the wound. Amputation of the wounded member has also been proposed, particularly in chronic cases, and in one or two it has succeeded. I have made trial of it in but one instance, and in that it failed. Acute tetanus had followed a lacerated wound betwixt the thumb and forefinger; amputation of the fore-arm was perform-

ed, and immediately after the operation, the spasms abated ; but they soon returned, notwithstanding the free use of opium, &c., and the patient died. In this case, the branch of the median nerve was found partially divided, and its cut extremities were thickened and inflamed. During the operation, I wished to abstract a considerable quantity of blood, but the arteries seemed to be so spasmodically contracted, as to permit the flow of a small quantity only. On examination after death, the median nerve was of its natural appearance, excepting at the bend of the arm, where it was of a bright-red colour. No change could be perceived in the brain or spinal chord, though the examination was conducted with the utmost care.

*Of Ulcers, or Breaches of Continuity in the Soft Parts of the Body, with Secretion of Purulent or other Fluid.*

THESE vary much in disposition and appearance, follow wounds, abscesses, sloughing, eruptions, &c., and often occur without any previous læsion of the surface. Those most generally met with are comprehended in the following classes : 1. The simple purulent ulcer, or healthy or healing sore. 2. The weak or sluggish ulcer,—a sore with undermined integuments and an unhealthy state of the cellular tissue. 3. The indolent ulcer,—a sore with hard elevated edges, and presenting little or no appearance of reparation. 4. The irritable ulcer,—a sore with over-action. 5.

An ulcer with a varicose state of the veins. Besides these, there are sores connected with diseases of the bones, and others arising from specific action; the former have been already treated of; the latter are reserved for consideration. Ulcers change their characters, as from simple to indolent, and from that to irritable, inflamed, &c.; and the change depends on situation, on the state of the constitution, and on the treatment which they receive.

I. The appearances of the first class were described when the healing of wounds by granulation was considered. They heal more readily on the upper extremities, on the face, neck, and trunk, than on the lower limbs; for in the former parts the circulation is more vigorous, and the natural processes of cure proceed more easily, and are less liable to interruption. The sore only requires rest, a clean condition of the surrounding parts, mild and light dressings, and moderate support; dry lint or lotions are preferable to ointments, since the latter are apt to irritate by rancidity. When it has contracted to a small size, some powder, as flour or calaminestone, or a piece of dry lint, may be applied, so as to allow a scab to form for the protection of the subjacent surface; but this will, in most cases, be better accomplished by touching the surface lightly with lunar caustic; the fluids on the part are thereby immediately coagulated, a crust is quickly formed, and by covering it with dry lint it is retained in its situation, whilst the process of cicatrisation proceeds beneath it: if a small quantity of matter should be

secreted, it readily escapes by the sides of the crust, without disturbing either it or its covering. Sores on the lower limbs are more difficult to manage. They are tedious, on account of their situation; the parts are at a distance from the centre of circulation, their action is weak, the return of blood is tardy, and the same facility is not afforded of restraining the motions of the part as in the upper extremities. In persons of a good constitution, however, the simple purulent sore often heals speedily even in the lower limbs. During the cure, the patient must be a good deal confined to the recumbent posture, and when erect, a bandage or laced stocking must be applied to the limb; thus the return of blood is assisted, swelling is prevented, and the affected parts placed in a state of comparative rest. Much pressure ought to be avoided, as it is apt to produce bad effects upon the sore, causing absorption of the granulations, thin bloody discharge, and great tenderness of the surface. After cicatrisation, the scars may be absorbed and sores reproduced, by external injuries, or an unhealthy state of the body; and so much does the state of a sore depend upon that of the general health, that the one is a good index of the other.

II. In the second class of sores, or those with weak action, the granulations are high, flabby, of a pale colour, and possessed of little sensibility or vascularity; the discharge is gleety, and the surface is liable to be destroyed by ulceration, or sloughing, upon the slightest excitement of the circulation in the part.

The surrounding integuments are generally of a bluish colour, in consequence of their separation from the subjacent parts, and in several places of the neighbourhood small, unhealthy, detached abscesses may exist; at some points of the sore, glairy fluid is seen to ooze out on pressure, and a probe can be passed pretty deeply into the cavity of an abscess in the soft parts beneath. These sores may arise from an unhealthy condition of the cellular tissue, taking place spontaneously, or following slight injury; they are attributable to the state of the constitution, and may result from an ulcer, originally of a healthy character, which has remained long open, in consequence of its great size, or other impediments to its contraction. It is the business of the surgeon, in cases of this description, first to obtain a sound foundation, by destroying the unhealthy skin and cellular tissue; the free application of caustic potass will answer this end most readily and effectually. Its application is attended with great pain, but the practice is more successful and less severe than the removal of the unsound parts by the knife or other means. The small abscesses may be all freely laid open; the diseased cellular tissue may be cut into, or cut away; in short, incisions may be made in all directions, and in every portion of the affected part; but still it will be found that the granulations, as they appear, become pale and flabby, that they spring from a loose and powerless base; matter will again collect; the surrounding skin will again be undermined; no progress will be made towards soundness. But by the potass,



the neighbouring sound parts have their actions roused; and the healing is carried on rapidly. After its application, poultice for a few days, and then stimulate both internally and externally, according to circumstances, the parts being all along well supported. The continued use of warm fomentations, or poultices, is prejudicial, as tending to diminish still farther the action of the parts; ointments, also, will generally do harm.

III. Indolent ulcers, which have long existed, are frequently met with on the lower limbs. Their margins are thick and insensible—their surfaces smooth, hollow, and of a pale colour—the discharge is scanty, and adheres to the surface. A sore, having been long open and neglected, degenerates into this state. Poultices are to be applied for a day or two, to clean the surface, promote the discharge, and soften the callous margins. This is the more necessary, if, as is often the case, the sore, or the surrounding integuments, are inflamed when the patient applies for relief. Afterwards the applications must be stimulant. In such cases only is adhesive strap applicable, and in them it produces the most beneficial results. Supposing the ulcer to be situated on the fore and middle part of the leg, a bandage is firmly applied from the toes to a little below the sore; the ulcerated part of the limb is then encircled by narrow strips of adhesive plaster, tightly drawn, and with the extremities of each strip crossing immediately over the ulcer. Some tow is placed on the plasters, and the bandage

is brought tightly over the dressings, and continued for some way upward. By this application the margins of the sore are brought nearer to each other, and the ulcerated surface is diminished; the sluggish granulations and the subjacent parts are stimulated, and, becoming possessed of vigorous action, proceed in the process of reparation speedily and effectually; the surrounding parts, previously turgid and œdematous, are by the pressure brought to the same level with the newly-secreted matter, and new skin is quickly formed; but in the previous state, the old skin was much elevated, and possessed of such action as to cause a continuance of that elevation; now, by the compression, the whole limb is properly supported, serous effusion prevented, and œdema removed; the livid swelling of the lower part of the limb, which might arise from the tightness of the adhesive plaster, is obviated by the bandage being first applied. A feeling of uneasiness in the limb generally follows such dressing, but is of short duration; should it increase, so as to amount to pain, the pouring of cold water occasionally over the dressings will soon restore the parts to comfort. Or the adhesive plaster may be slit up behind, immediately after its application; indentation of the limb being thereby avoided, and sufficient pressure at the same time kept up on the sore. If possible, the dressings ought not to be removed before the second day, as much irritation will be produced by their frequent renewal. The benefits arising from this mode of treatment are truly surprising; the slow and indolent ulcer is speedily

converted into the simple purulent sore ; the white and recent cutaneous substance encircles small pointed and florid granulations, which bleed from the slightest rudeness ; and the space formerly occupied by an unsightly sore is soon diminished to a small and firm cicatrix. In the old and debilitated, however, in whom the indolent sore most frequently occurs, the integuments remain purple and shining, and from very slight causes the cicatrix is absorbed, and breach of surface is reproduced.

IV. In the fourth class of sores, or the irritable from over-action, the sore and its edges are of a jagged, irregular appearance, the discharge is thin and bloody, and considerable pain is experienced. The sore is often covered by an ash-coloured slough ; on the removal of which granulations arise, but they either again slough, or are removed rapidly by the ulcerative process. In the treatment of such sores, complete rest and soothing applications are the means on which most reliance is to be placed. Warm and soft poultices, hot fomentations, solutions of opium, and the occasional use of a vapour bath to the part, may be enumerated amongst the means best fitted to allay the irritated temper of the ulcer. When the surrounding integuments are swollen, red, painful, in short evince marks of inflammatory action going on in them, the feelings of the patient will be rendered grateful, and the cure advanced, by abstraction of blood from the parts by punctures. When the nature of the sore is changed, and when cicatrisation

has commenced, the treatment is similar to that of a simple granulating surface—light dressings, due support of the parts, and repression of exuberant granulations by the nitrate of silver or sulphate of copper.

V. The applications to sores connected with a varicose state of the veins must vary according to the appearance of the part. In all cases, a degree of compression on the affected limb must be maintained, both during the continuance of the sore, and after it has healed. The usual situation of such sores is on the leg, and the varicose state of the veins does not, in general, extend above the knee; in such cases, a radical cure may be attained (provided the patient wishes to encounter the attendant risks, rather than submit to a continuance of the disease) by effecting an obliteration of the saphena major vein. The manner of doing this, and its effects, were mentioned while treating of diseased veins. In some cases, the saphena minor is also varicose to some extent, though still affording a healthy point on which the potass may be applied.

Ulcers are occasionally prevented from healing by dead portions of tendon, fascia, or cellular tissue, and are accompanied in general with a bad state of constitution; in such it is necessary to clean the surface by a powerful escharotic, and the best is potass. Otherwise, granulations will be produced quickly, it is true, and in abundance to supply the original substance; but then they are flabby and exuberant, new skin is formed slowly, if at all, and

the sore does not contract ; but by removing the dead or half-dead surface, a healthy and firm foundation is prepared, on which is securely and gradually raised the new matter for cicatrization. But caustics are applied injudiciously to firm and healthy granulations which have not yet reached the level of the surrounding parts ; they are only useful in repressing exuberant granulations, or in destroying half-dead parts, which interrupt or deteriorate the cure.

Along with the topical treatment of ulcers, internal means are, in most cases, indispensable. Thus, in indolent ulcers, the state of the constitution is often sluggish, and ought to be changed by the exhibition of alteratives or stimulants ; and, with this view, much benefit is derived from a prudent and restrained use of mercury, from the *lytta vesicatoria*, from minute and occasional doses of arsenic, from the free exhibition of sarsaparilla, and from generous diet, porter and wine. It is, however, altogether impossible to lay down fixed rules for the management of sores ; every one has some peculiarity in its nature and appearance, every one requires some peculiarity in the applications and mode of dressing, and what may suit well one day, will often prove inert or injurious on the succeeding. In this department of Surgery, one practitioner excels another, not by his superior knowledge of the various applications, but his acuteness in selecting the remedy adapted to the particular state of the sore, and in accommodating the different ointments, lotions, &c. to the different characters which the ulcer assumes during its pro-

gress. Certainly, an application ought never to be changed when it agrees, be it poultice, ointment, or lotion. The healing of sores is very easy in some constitutions, and very difficult in others. Hence, it has been supposed that the long existence of a sore is a salutary process of nature, tending to relieve or prevent some more serious affection, and on this account some are little solicitous to procure its cicatrization, or at least are careful that the cure shall not be a speedy one. If, indeed, an extensive sore, or a series of sores, be suddenly dried up, the circumstance must be considered as very unfortunate, and the consequences may even be fatal; but such an occurrence is unusual, and the patient may in general be saved by the timely insertion of an issue in the neighbourhood of the sore, or by an active employment of what is best calculated to ensure a renewed discharge. Some sores have a disposition to extend by sloughing, and such frequently attack the lips and pudenda of weakly children; they are also met with, amongst the lowest class of prostitutes, in the cleft of the nates, in the groin, &c., and in such cases the sore closely resembles hospital gangrene.

*Of Hospital or Contagious Gangrene, and Sloughing Phagedena.*

THIS disease has been long known, and has proved very fatal in crowded and badly-aired hospitals, though neither town nor country is exempt from it.

It may break out at any season, but hot and sultry weather is most favourable to it. No breach of surface, however small, is secure from its attack. The wound becomes painful and swollen, and loses its healthy, florid appearance; the granulations are flabby, and appear as if distended with air; vesicles form, containing serum or a bloody fluid; the pain is stinging; the secretions are suspended; and the wound is either altogether dry, or covered with slimy tenacious matter. An ichorous discharge follows, the pain increases. The sore assumes a circular form, and its edges are everted; erysipelas attacks the surrounding integuments, often extending over the whole limb, and forming a principal feature of the disease. In fact, violent erysipelas and hospital gangrene are affections very closely allied to each other, often arising at the same time, and from the same causes. Both are accompanied with great constitutional disturbance; but in erysipelas it precedes, whilst in hospital gangrene it follows, the appearance of the malady. The lymphatic glands, in the neighbourhood of the gangrenous part, inflame and suppurate, the skin gives way, and the gangrene soon seizes the newly-formed sore. Fever supervenes, the pulse is full and strong, and the surface hot; there are nausea and thirst; the tongue is brown, and the bowels much disordered. The inflammation and ichorous discharge increase. A thick slough covers the sore, and its fœtor is peculiar and intolerable. The burning pain is excruciating. Blood oozes out, and, in the last stage, the hæmorrhage is often copious

from large vessels exposed by the ravages of the disease. Now, extensive mortification occurs, the strength fails, the pulse becomes tremulous and indistinct, the features collapse, the surface is bedewed with a cold sweat, diarrhoea and hiccough come on, and death puts an end to the patient's suffering. Such is the progress of the disease in those who were previously in perfect health. Often, however, it is attended with typhoid symptoms almost from the beginning, in people whose constitutions are wasted, who have long laboured under disease, or who have been long confined in hospital. The important distinction between these cases must influence the treatment: what succeeds in the one will destroy in the other. It is not the name of the disease which is to be combated, but each symptom as soon as it presents itself.

Those who have been once afflicted with hospital gangrene are extremely liable to its recurrence, and that too on the same sore; though the secondary disease is much less acute. This form has been termed Sloughing Phagœdena, and may seize a sore not previously affected with gangrene. The wound, recovering from the first attack, and appearing to heal rapidly with good discharge and healthy surface, presents, near its edge, a small dark spot or ulceration, of the size of a small bead or shot, of a circular form, with a ragged edge, excavated surface, and fœtid discharge. Several such points may appear; they spread rapidly, unite, and the surface is soon destroyed. It is not uncommon to find one part of the sore of a healthy appearance, and even cicatrizing, whilst in



another part the surface is rapidly disappearing. The patient complains of a burning sensation in the part; suppuration occurs round the edges and beneath the slough, and the dead parts separate; but the same process again takes place, and another slough forms. The malady proceeds often with a rapid and alarming pace; the sloughs are soft, pulpy, and reddish, and separate one after another, exposing muscles, nerves, blood-vessels, and bones. Joints are opened into, and the vessels, having been exposed, perhaps for a day or two, give way, and fatal hæmorrhage ensues, their cavities not being obstructed with coagula as in sphacelus. The patient is sick, has no appetite, and labours under other symptoms of deranged stomach; there are restlessness, a small quick pulse, and all the symptoms of a weakened and sinking system. The ulceration becomes more rapid, the discharge is bloody and peculiarly offensive; all the symptoms increase in violence, and may proceed for fifteen or twenty days, or terminate in four or five either in convalescence or death.

Hospital gangrene is supposed to arise from a variety of causes: from the state of the atmosphere, moist and hot—from inattention to cleanliness, the sore being seldom wiped, the matter collecting amongst the dressings, and becoming acrid by putrescence—from irritating applications, as rancid ointments—from a too stimulating diet, and from the abuse of wine and spirits—from mechanical irritation, in moving the wounded over rough roads and in bad conveyances, as after great engagements—from

specific contagion without immediate contact. In general it is propagated by direct communication, by the application of morbid matter from sponges, dressings, &c. It is difficult, however, to say how the disease originates. It cannot be from contagion or inoculation, and what produces disease in one person, may reasonably be supposed likely to do so in another.

In the treatment of this scourge, great attention must be paid to cleanliness in all circumstances. Free ventilation must be constantly preserved in the apartments of the sick, and fumigations assiduously employed. The infected ought to be separated from the others, and but few patients placed in the same ward. Stagnant drains and accumulations of filth out of doors are to be removed, otherwise, during hot weather, the atmosphere becomes much vitiated. Care must be taken, also, to destroy all the dressings which have been used, and not to employ sponges, but to wipe the sore occasionally with tow, which is to be burnt immediately, being an article of little value and easily procured. Too much attention cannot be paid to the cleaning of those instruments with which gangrenous sores have been treated, before they be applied to healthy wounds. As to the constitutional treatment, the alimentary canal must first be purged of its feculent contents, and afterwards preserved in a rather lax condition. When the wound or sore is surrounded with intense inflammation, and when the skin is dry and the pulse strong and full, with all the other symptoms of an inflammatory diathesis, immediate recourse

must be had to free abstraction of blood from the system, as thus only can the progress of the disease be efficiently arrested; and if inflammatory symptoms exist, when there is reason to expect the occurrence of the disease, though no symptom of it has yet appeared, then, too, venesection combined with purgatives is demanded, as being the most powerful preventives. Emetics are also recommended. When the affection is from its commencement accompanied with typhoid symptoms, depleting measures must do irreparable mischief; in such cases the local pain and irritation will be relieved by the exhibition of opium or camphor, and it will also be of service to preserve a perspirable state of the surface by means of Dover's powder, or other diaphoretics. Vinegar, weak acids, the nitric and muriatic acids diluted, are used as external applications, and nitrate of silver, the red oxide of mercury, and the actual cautery, have been applied with the view of removing the diseased parts, and procuring a healthy surface. Arsenic in solution, used so as to produce a slough, and followed with hot dressings, has frequently proved highly useful.

### *The Malignant Pustule*

Is a gangrenous inflammation of the skin, rarely extending to the subcutaneous cellular tissue, and in this respect differs from carbuncle, which commences and is seated in the cellular texture. It arises from the application of the fluids of animals which have

died of putrid diseases common in some marshy and low situations. It is communicated not only by matter from the diseased part, but also by the blood of the animal ; thus it is frequently observed in those who handle the recent skin or flesh ; and the excrements also appear to be possessed of the poisonous principle. It spreads from one person to another by contact. But there is much reason to doubt, whether carrion introduced into the stomach produces bad effects or not, though by some it is maintained, that even the respiration of effluvia from putrescent substances produces malignant fever, with foetid evacuations and gangrenous patches on the skin. In the West of Scotland, an instance occurred some years ago, in which several persons lost their lives from eating the flesh of dead animals which had been washed ashore. The occurrence of malignant pustule is rare in this country. But, very lately, I met with a well-marked case in a shoemaker, who had been employed in killing some sickly pigs. Whilst turning over and removing the abdominal viscera of one of them, he had scratched his finger slightly with a pin stuck in his jacket, and he then perceived that the contact of some putrid matter from the intestines caused great pain. On the third or fourth day afterwards, he presented himself with a malignant pustule formed on the hand between the fore and middle fingers. The pain was very severe, and the disease seemed to be fast extending. Active treatment was employed, and the patient enjoyed a speedy recovery. The disease attacks the hauds,

neck, face, shoulders, &c. of butchers and others, who carry, or in some way deal in, carrion. It has also taken place in consequence of the hand being introduced into the rectum—a veterinary method of removing scybala—of an animal labouring under putrescent disease. A pustule appears on the part affected, containing a serous or a dark-coloured fluid; and the base ulcerates, extending through the skin to the subjacent parts; at first it is accompanied with a pricking sensation, afterwards the pustule enlarges and becomes brown, and the pain is burning and itching. The vesicle when opened, or when it has burst spontaneously, furnishes a few drops of red serum, and the pain is thereby relieved for a few hours. A hard, movable, and circumscribed tubercle forms, without alteration of the surrounding skin. The bottom of the sore is yellow, greenish, or livid, and the sensation is that of acute heat and erosion. Phlyctenæ spread around. The tubercle becomes black in the centre, and an eschar forms; the patient gets irritable and languid. The gangrenous point begins to extend, and that alarmingly; great swelling takes place, elastic, red, and shining, more emphysematous than inflammatory or œdematous. The burning pain is aggravated; the patient has a feeling of weight and stupor; great constitutional disturbance follows, there are slow fever, a small pulse, a dry and brown tongue, and unquenchable thirst; a low muttering delirium ensues, and under these symptoms the patient soon sinks. After death, the fœtid body swells. The disease sometimes termi-

nates fatally in twenty-four hours or less ; but generally the patient's sufferings are more protracted. In the treatment, superficial scarifications are of little avail. The only topical application which can be relied on, is a powerful escharotic, applied freely to the part, and at an early stage, before swelling and constitutional affection have been added. By it the parts replete with virus, being immediately deprived of vitality, are soon thrown off. Thus the virulence of the poison is annihilated, it is rendered inert, and is concentrated in the slough, and the surrounding parts are stimulated, and receive vigour of action, which enables them to resist any further inroad, and to detach quickly the mortified substance. For this purpose the most effectual and convenient escharotic is the caustic potass, but the liquid muriate of ammonia may also be employed. The vesicle is opened, and the caustic applied to the exposed surface ; and if necessary, the eschar may be afterwards divided, and the remedy reapplied. In the absence of other escharotics, the actual cautery will prove a valuable substitute. After the separation of the slough, the sore is to be dressed with slightly stimulating applications. Bark, camphor, and mineral acids, are given internally, and the patient is enjoined a light diet, with a moderate allowance of wine.

*Of Ulcers of the Genital Organs, and their  
Consequences.*

IT were unprofitable to enter here upon the *History* of Venereal Affections, as it is a subject of no practical utility, still involved in uncertainty, and mystified by disputation. It will suffice to describe the different forms of the disease, and state the treatment applicable to each.

During the last century, and in the beginning of this, much greater ravages were produced by the disease than now; and its growing mildness, though partly owing to a change in the poison itself, is mainly attributable to a concomitant mildness in the measures by which it has been, and is, opposed. Every form of the affection, as soon as it appeared, was opposed by a counter poison, mercury; and the practitioner, relying implicitly on this mineral as a specific, and being unaware of its dangerous properties, continued to gorge the system with the supposed remedy, subverting the constitution of his patient, making in many cases no impression on the disease, but changing the antidote into a poison equal, if not more potent than the one which it was intended to destroy. This last result has been propitious to our science and to mankind. But let it not be inferred that mercury now is, or ought to be, entirely dismissed from the treatment of this disease, or in practice generally: often no other means are effectual; but it should always be prescribed most cautiously and sparingly.

The effects of the venereal virus are divided into primary or local, and secondary or constitutional ; and these present a great variety in their appearances, characters, and tendencies. They are sometimes modified by the constitution, or by the remedies ordered in the first stage ; but there can be no doubt that different poisons exist, producing distinct kinds of ulcers, which again are succeeded by different constitutional affections.

The most common kind of sore is the *simple ulcer*, at first excavated, in consequence of the process of ulceration continuing ; afterwards the ulceration stops, and granulations, somewhat fungous, supply its place, so that the surface is raised above the level of the surrounding parts, and has a smooth soft appearance ; there is no hardness of the edges, and there is no tendency to slough or extend by ulceration. Sometimes it commences in the form of a pustule, which soon gives way, discharging its contents, and leaving an exposed surface, in which the process of ulceration quickly proceeds ; but often it arises from simple abrasion of the surface. Different forms of sores may exist on the glans and prepuce at the same time ; and it is maintained, that one sore may produce another of a different kind, and the same is asserted with regard to eruptions. The simple ulcer, as well as other sores, is produced by the contact of secretions, generally morbid, but often apparently healthy, with a susceptible surface. Sores, with eruption and sore throat, sometimes appear in one or both individuals immediately after marriage,



and probably arise from the acrimony of the female secretions causing tenderness and ulceration of the parts. The application of gonorrhœal matter readily produces the simple ulcer on the glans or prepuce, particularly if an abrasion or rawness existed; and if the matter be allowed to remain on an unbroken surface, a pustule will form, and ulceration follow. From this latter cause numerous sores are produced, separated from each other by sound parts, and not extending into one continuous ulcer; and this condition may have been preceded, on the glans, by a rawness of the surface and a profuse discharge, or by a herpetic eruption on the mucous lining of the prepuce. One man may be affected with gonorrhœa, and another with ulcer, from connexion with the same female, the same day or hour; and it is doubtful whether the effect is not similar, in both cases, viz. ulceration; for it is supposed, that in gonorrhœa the discharge, in some cases, proceeds from patchy ulceration of the mucous lining of the urethra, similar to the ulceration usually met with on the glans. In examining women who have communicated infection, very often no sores are found, and but little unhealthy discharge. In short, the simple elevated sore may arise from the application of secretions from an unbroken surface, from inoculation of matter from a similar sore, or spontaneously, from inattention to cleanliness. Sores with elevated surface, more extensive than those of the glans and prepuce, occur on the skin of the penis and scrotum, or in the folds of the thigh; and in women they are

often in the perineum, the cleft of the nates, &c. These will soon disappear under the application of a strong solution of the murias hydrargyri, in the proportion of two or three grains to the ounce. Sores of different kinds arise at various periods after the application of their cause, from a day or two to some weeks, or longer, but the usual time may be said to be from four to eight days. The duration of the simple elevated sore may be modified by various circumstances—by the constitution of the patient, his mode of living, and the attention paid to the affected part. It seldom remains open above a few weeks, but I have seen it unhealed at the end of several months. Such ulcers produce, as readily as any other sores, enlargement of the inguinal glands; they are a source of irritation, the effects of which may be extended along the lymphatic vessels, to the cluster of glands in which the absorbents terminate, so as to cause inflammatory action ending in indurated enlargement; or venereal virus from the sore may be taken up by the lymphatics, deposited in the glandular structure, and produce a similar affection. Buboës thus caused are situated in the upper cluster of inguinal glands; if the lower cluster is affected, it is to be presumed, that the cause is not in the organs of generation, but in some part of the inferior extremity. From the existence of venereal bubo, nothing can be deduced as to the poison, or the effects to be produced on the constitution. For enlargement of glands in the course of their lymphatics, will occur from irritation, whether connected

with a mild or malignant virus, or totally devoid of any poisonous quality.

From the simple ulcer there arises a constitutional affection, in all respects resembling that which follows gonorrhœa, (a disease which will be treated of under affections of particular mucous surfaces;) but before attending to this, it will be proper to advert to another form of ulcer, which differs but slightly from the preceding in primary and secondary symptoms. It is a sore with a brown surface, either on a level with, or above, the surrounding parts, with defined and elevated edges, with no cartilaginous hardness of base or margins, and with no tendency to spread either by sloughing or by ulceration. Such may occur in the same situation as the simple sores, but they often form on the outer surface of the prepuce, or on the scrotum; and are not unfrequently met with round the orifice of the prepuce, which is a most troublesome situation, as, in healing, they generally produce phymosis. The bubo which follows this, differs from that caused by the simple sore, in having, after ulceration of the integument, a greater disposition to burrow; and this tendency is more marked where mercury has been employed. From either of these forms of ulcer, it sometimes happens that constitutional affections arise, either during the existence of the sore, or some weeks after it has cicatrized.

The usual secondary symptoms are those attendant on a papular eruption. There is fever, with pains referred to the head, to the joints, chiefly the larger ones, and to the chest, which latter symptom

is sometimes attended with dyspnœa. This indisposition is followed by the appearance of a papular eruption, termed lichen, on the face and trunk, the extremities being less thickly studded. The fever subsides in a great measure after the eruption appears and comes fully out ; but fresh crops of papulæ may appear, and in this case, the fever continues little abated, until the eruption begin to fade. The eruption consists, in the first instance, of simple elevations or pimples of a red colour, and these do not appear at once, but gradually ; so that some have assumed the form of cones, with minute collections of matter in their apices, whilst others are mere elevations. When they fade, the spots are of a copper tint, and become covered with thin scales, in consequence of the cuticle desquamating ; but this latter appearance can never be confounded with the scaly eruptions following another description of primary sore. In all cutaneous eruptions, attended with any febrile action, there is a tendency to sore throat, with tenderness of the eyes, and this eruption is not exempt from a similar affection ; the fauces feel raw and tender, and are pained in deglutition ; on looking into the throat, the mucous surface is found red and swollen, and the tonsils are generally enlarged ; but there is seldom any breach of surface, and, when this does occur, it is rather entitled to the appellation of excoriation than of ulceration ; occasionally the surface is covered with a thin coating of lymph. As, in similar affections, unconnected with any discoverable cause, the

lymphatic glands, at the angle of the jaw, are not unfrequently swollen and painful.

Such is the usually mild character of this affection ; but if its progress has been interrupted by any means, more particularly by mercury, it assumes a more complicated form, and a less tractable nature. If that mineral is administered in the usual style, and at the commencement, when the fever and other symptoms are high, the patient's sufferings are all much aggravated. After the fever has subsided, the eruption will often be found to disappear under the use of mercury ; but it is extremely apt to recur, as soon as the system has shaken itself free from the effects of that medicine. The mercury produces an irritation, which supersedes the eruption, but by frequent repetition its effects on the system diminish ; it fails to create an irritation more powerful than the disease to which it is opposed, and consequently the eruption does not yield, but during its use is frequently reinforced by fresh crops of papulæ. If the eruptive fever, and advanced stage of the disease, are imprudently and suddenly arrested by the use of mercury, by exposure to cold, or by other means, inflammation of the iris or joints often follows, of a very violent form, and not to be easily moderated. No one thinks of repelling measles or other eruptive diseases, lest affection of internal organs supervene ; and for the same reason, every precaution must be used to allow this form of eruption to take its own course, while we merely regulate the constitutional symptoms as they obtrude.

Another form of eruption which occasionally, though much less frequently, results from either of the above mentioned sores, is the pustular. It is preceded by fever, and consists of rather large pustules, separated from one another, and not very numerous. After their apices give way, and the contained pus is discharged, a thin scab is formed, and on its separation a small ulcer is left, which in general soon heals from its margins, leaving a dark-coloured spot to mark its situation. The papular and pustular eruptions are sometimes blended, a few pustules appearing amongst numerous papulæ, or *vice versâ*. The pustular disease is not of frequent occurrence, and in proportion as it approaches the papular with desquamation, it becomes milder and more easily removed. In it, as in the papular, mercury proves injurious.

The phagedenic form is the most dreadful and unmanageable of all; most uncertain in progress, and direful in event, and often rendered still more destructive by the mode of treatment adopted. Fortunately, it is now seldom seen, though not long ago it was well known as a perpetrator of dreadful havoc under the name of black pox.

It is a corroding ulcer, without hardness of the surrounding parts, presenting no appearance of regeneration of the parts which have been destroyed. It may arise either from a pustule or from abrasion. Sometimes it destroys the prepuce and glans in a few days, at others it spreads deceitfully, healing at one part, and destroying at another. The ulceration is often deep, penetrating the corpora cavernosa, or the

corpus spongiosum urethræ ; and in such cases, it is followed with violent hæmorrhage, which often produces a great and sudden improvement in the sore. After slow cicatrization, it not unfrequently happens that the scar gives way, and the ulceration returns.

Sometimes another character is given to the sore, —the parts slough. In this modification, a small black spot is first observable, unattended with pain ; it enlarges rapidly, and after no long time the mortified part separates, exposing an unhealthy surface, which is immediately attacked and progressively destroyed by phagedena. The part may again slough, and, by an alternation of mortification and phagedenic ulceration, the external organs of generation, male or female, may be wholly destroyed. In the present day, however, its ravages are much less extensive and more easily combated than formerly, and it seldom if ever proves fatal. Among the last instances of it which I have seen, the patient suffered two attacks at the interval of two years. During the progress of the disease, he was seized with delirium tremens ; a bubo formed and ulcerated ; violent hæmorrhage occurred from the sore, sloughing and phagedena alternated, and both prepuce and glans were entirely lost. An eruption followed, accompanied with ulceration of the throat and nostrils. He recovered much mutilated. Ulcers originally of a simple character may become affected with phagedena, or sloughing, from the state of the constitution, from mismanagement, or from exposure to an unhealthful atmosphere. But in such cases, after the separation of the slough,

the exposed surface is found to be of a healthy granulating character, contrary to what is observed in the originally phagedenic disease. Buboës, when they occur, have the same malignant action as the primary sore, the breach of surface is extended either by sloughing or by phagedenic ulceration, and the edges of the sore are ragged and undermined.

The secondary eruption which follows the phagedenic form, is pustular, though differing from that which has been already noticed. The pustules soon give way, and ulcers remain, covered with thick scales or crusts, which sometimes increase layer by layer, so as to become prominent, dense, and of a conical form. After the separation of the crusts, the ulcers are found superficial, rather unhealthy, and showing a disposition to extend, chiefly towards the circumference. When healing, the process of cicatrization frequently proceeds from the centre of the sore, which is still enlarging at its circumference. The reason for this unusual mode seems to be, that ulceration does not commence in the secondary sores till the crusts which cover them have been removed; they then are very superficial, not extending through the thickness of the true skin; and the ulceration does not go on in the centre of the original sore, but towards its margins, so that a portion of true skin remains in the centre of the sore, whilst it is gradually destroyed towards the margins. Then, whilst the surrounding skin, which usually forms the new cutaneous texture necessary for reparation, is gradually and progressively destroyed, the remaining



old skin in the sore assumes an excited action as in ordinary cases, and from it the requisite new texture is formed, and gradually extends over the surface, until it meet with a similar substance, which has been produced by the surrounding skin after the ulceration in that quarter ceased. Thus the general principle, that skin is formed by skin, is even in such instances found to be correct, the healing from the centre not being caused, as some have supposed, by the former skin being at that part completely destroyed, but from its having remained unaffected, or nearly so. The appearance of the eruption is preceded by general indisposition, and occasionally by smart fever. It is sometimes extensive, but is in general confined to the upper parts of the body.

Ulcers of the throat occur of a very alarming kind, quickly destroying the parts attacked, spreading chiefly towards the posterior part of the fauces, rapidly extending to the pharynx and to the nostrils, and in some instances also involving the larynx. The pendulous velum of the palate and the tonsils are often wholly destroyed, the bones of the nose, more especially the turbinated, are deprived of their coverings, and exfoliate, the osseous and cartilaginous portions of the septum are discharged, and the nose becomes sunk, or is supported merely by the columna. The patient's breath is fœtid, respiration is in some degree obstructed, a foul ichorous discharge flows from the nares, and the surrounding parts are inflamed, swollen, and excoriated. The countenance is greatly disfigured. On looking into the throat, no-

thing is seen but an extensive ulcerated surface covered with white adherent matter, and exhaling an offensive fœtor, particularly when the bones are affected. Respiration is nasal, and the speech indistinct. When the larynx becomes affected, the patient may be almost considered as lost; phthisis haryngea is established, the symptoms and treatment of which will be afterwards mentioned. The mutilating affection of the nose does not seem to be produced by any other form of the venereal disease. Along with the eruption and its after effects, severe pains in the articulations, particularly in the knee joint, often occur, and are always much aggravated during the night. Nodes seem to be produced only in those cases in which mercury is exhibited; their most usual situation is on the fore part of the tibia; severe pain is felt in the part, which becomes slightly swollen, and of a bright red colour; the swelling feels dense and firm, being a simple enlargement of the bone. They often occur when the patient is taking mercury, and when in fact the constitution is completely saturated with it. This medicine may interrupt the progress of the disease, may remove the eruption and the ulcers of the throat, but it at the same time transfers the disease to deep unyielding parts, to the bones and their coverings, to the fasciæ, &c.

The last distinct form of the venereal disease is the scaly—syphilis, or true pox. The primary sore, termed a chancre, “is somewhat of a circular form, excavated, without granulations, with matter adhering to the surface, and with a thickened edge and base.

The hardness or thickening is very circumscribed, not diffusing itself gradually and imperceptibly into the surrounding parts, but terminating rather abruptly." Such is the appearance generally presented by the sore when situated on the glans and prepuce; it generally commences in the form of a pimple, without much surrounding inflammation. Sometimes the ulcerated surface is very inconsiderable, but there is always the abrupt and remarkably dense thickness which serves as a distinguishing mark. The non-syphilitic ulcers may have surrounding hardness from the first, or in consequence of the application of stimulants and escharotics, but this is diffused into the neighbourhood, and is not of that remarkable solidity peculiar to chancre. It is seldom that more than one chancre occurs; the usual situation is on the glans and lining of the prepuce; but they occasionally form on the outer surface of the prepuce, and on the dorsum penis. In the latter situation, the sore assumes a somewhat different appearance; it is in general larger, the hardness of the base is not so great, the excavation is less, and the surface is of a livid hue; when allowed to proceed uninterrupted, the livid surface is alternated with that of a light brown or tawny colour. Chancre is an indolent ulcer when compared with the phagedenic or sloughing, the ulceration proceeds very slowly, and in proportion as it advances, the surrounding hardness increases. Phymosis occasionally takes place in consequence of chancre situated at the orifice of the prepuce, but not so frequently as when that situation is occupied by

superficial sores of a more active nature. Bubo sometimes appears in both groins, or in one, sometimes on the same side with the sore, often on the opposite, and not unfrequently when the sore is healing, or after it has healed. It may suppurate and give way, or may subside without having advanced to suppuration. It differs in no respect from the swelling of the glands from other causes, either in its swelled or open state. Neither does the occurrence of a bubo render it more probable that constitutional symptoms will follow. Enlargement of the glands is often caused, or at least hastened, by the patient continuing to walk about and exert himself during the existence of a sore, and whilst the absorbents are in an irritable state; but a bubo may be caused by irritation or excoriation in any way produced, and it not unfrequently occurs without any apparent cause. In some cases of chancre or other ulcer, the absorbents along the dorsum penis become swollen, and occasionally suppurate. In former times, it was not uncommon for the surgeon to insist that all swellings in the groin were venereal, though no primary sore had ever existed; the virus was said to be absorbed from an unbroken surface, the patient's system was saturated with mercury, and the use of that medicine was persevered in, with the view of opposing those symptoms of a ruined system which itself had produced. Such delusions have now happily passed away.

The eruption which follows the chancrous form of primary sore is scaly from the commencement, and by this character is readily distinguished from every

other venereal affection. It is generally preceded by an efflorescence or discoloration, rendering the skin of a mottled appearance. The scaly eruption is a form either of lepra or of psoriasis. The patches usually do not exceed a sixpence in size, are distinct and separate from each other, their base is of a dark red or coppery hue, the affected skin is not hard or rough, but soft and pliable, and seldom covered with crusts; as they extend, the edges are slightly elevated, and the centre, which alone is covered with thin white scales, appears flattened and somewhat depressed; when they begin to fade, the margins shrink and become paler, and desquamation proceeds slowly; a circular purplish red discoloration, with a central depression, remains for some time after the blotches have declined; the depression is permanent, but the discoloration disappears. The smaller patches, which assume a variety of forms, continue for some time of a dark colour, extend towards the circumference, become pustular, and at length ulcerate superficially, enclosing an area of sound skin. When depressions of the skin, as the folds of the nates, are affected, a scaly eruption does not take place, but soft and moist elevations arise, discharging a whitish matter, varying in form and size, and accordingly receiving various appellations, as condylomata, fici, marisci, &c. If no decided treatment is resorted to, and if the eruption is consequently permitted to follow its own course, thick crusts form, ulceration proceeds beneath them, the matter is confined, and the patch becomes prominent. Another secondary symptom of chancre is ul-

ceration of the throat, sometimes extensive, but generally situated in the tonsils, or their immediate neighbourhood. The ulcer is not preceded with much pain or swelling; "it is a fair loss of substance, (part being dug out, as it were, from the body of the tonsil,) with a determined edge, and is commonly foul, with thick matter adhering to it, like a slough, which cannot be washed away." Such ulceration may be simulated by excavated sores attending the phagedenic form of disease, and it ought to be more especially distinguished from an affection to which the tonsil is extremely liable, irregularity of its surface, enlargement and effusion of lymph, in consequence of chronic inflammation.

A more serious part of the secondary disease is affection of the deep-seated parts, ligaments, periosteum, and bones. The bones nearest the surface are principally affected; a swelling gradually forms on the tibia or ulna, without discoloration of the integuments, and without pain occurring till after a long time. The pain is most severe during the night. The inflammation of the periosteum is often very violent, the subjacent bone, as in the head or extremities, becomes necrosed, and exfoliates; but it remains to be seen, whether this will take place when mercury is more sparingly, if at all, administered. Ulcers betwixt the toes, occurring along with the above symptoms, are supposed to be venereal; they are unseemly, and peculiarly fœtid.

Such are the affections, local and constitutional, arising from a venereal cause; but the latter may be

simulated. Many affections of the skin, mucous membranes, and bones, resembling the venereal disease, may be produced by disorder of the constitution, by a decay of the digestive organs, by unwholesome food, and exposure to inclement weather, by inattention to cleanliness, and many other circumstances. Morbid poisons, not venereal, but of various kinds, may exist, and cause much mischief.

A disease resembling syphilis was produced by the cruel practice of transplanting teeth from sound people into the jaws of persons in the higher ranks of life, whose corresponding teeth were decayed. The latter were the affected party, and that justly.

A very infectious disease was at one time common in the poorer parts of this country, and known under the name of sibbens, or sivvens, chiefly occurring amongst the poor, ill-fed, badly-clothed, and worse-housed people in the Highlands. It was communicable by very slight contact, by kissing the lips of an infected person, smoking the same pipe, drinking out of the same cup, or using the same spoon. Cases of it are still occasionally seen. There are ulcers of the lips, mouth, throat, and nose; ulcerated patches and warty excrescences in the cleft of the thighs, in the axilla, and round the anus and pudenda. A pustular eruption appears, and terminates in hardened crusts. The same disease is known in Ireland, under the name of button-scurvy, and a similar one, called radesyge, has been described as occurring in the sea-coasts of Norway and Sweden. In Canada, also, something of a like nature was at one time

prevalent. The yaws, at one time common and destructive in the West India Islands, appear to be much of the same nature. Some of these diseases, more particularly sivvens, are very common amongst children; even in these days, children are not unfrequently born with copper-coloured blotches of the skin, and desquamation of the cuticle; or they may come into the world with these appearances, along with affections of the mucous membrane, hoarse voice, redness round the anus, &c. These are forthwith attributed to a syphilitic taint existing in either of the parents; and one or both are put under mercury; but child after child comes into the world in the same plight. Again, the disease is said to be communicated by children to the nurses, and *vice versá*. All these affections are rendered much more obstinate by full courses of mercury; the bones and ligaments become affected in consequence, but small doses of that medicine may prove useful towards the decline of the disease. Some have believed mercury a certain test of syphilis, maintaining that the disease, till checked by the specific, is never overcome by the constitution; that it is unchangeable, and regularly and progressively grows worse, where no mercury is employed; that, opposed by that medicine, it is stationary, and is permanently cured by adequate mercurial influence on the constitution. Whatever were the appearances, if they went off under mercury, the advocates for this practice set them down as those of syphilis, lues, or pox; if they did not yield to that mineral, they were termed syphiloid, pseudo-syphilitic, or



mercurial, for they did admit, now and then, that their favourite produced unpleasant effects. Such theory and practice are now exploded.

As to the *treatment* of local venereal affections, it may be, in the first place, remarked, that prevention is better than cure. The means employed for accomplishing this end are very various : oily applications, alkaline washes, &c. with the view either of preventing the matter from coming into contact with the genitals, or of completely removing it, when it has been but a short time applied. The best mean of prevention, however, is the simplest, and one which it is unnecessary to mention. In all affections of the penis, it is of the utmost importance to keep its extremity bound up to the abdomen ; rest and quiet must be strictly observed ; the patient must be confined to the house, particularly when the sore is irritable when swelling or bubo has occurred or is threatened ; and when the system is excited, and the eruption has commenced, the bowels must be kept gently open, the patient's diet must be low, and the sore, as well as the surrounding parts, are to be kept carefully clean. Whatever the nature of the sore may be, it is safe and prudent, in the first instance, to change its action by the use of the nitrate of silver, or to destroy the surface by the free application of escharotics, as red oxide of mercury or calomel ; the morbid poison is got rid of, and the surrounding parts are stimulated to a proper degree of action. But, in most cases, the patient does not apply for medical assistance, till the sore has been of so long

duration, as to preclude all hope of concentrating the virus by any local application. The simple superficial sores, and those with elevated margins, must be treated on the same principles as if they were totally unconnected with any specific cause, and the applications must be varied according to the peculiarities of the part affected, and the different appearances which the surface assumes during the progress of cure. Lotion is the form of application found preferable in most cases, and may consist of calomel and lime water, with mucilage, called the black wash ; of muriate of mercury, with lime water, called the yellow wash ; of the compound solution of sulphate of zinc, termed red lotion ; of a solution of nitrate of silver, or of copper. Ointments, if at all, ought to be used sparingly. The application of dry lint, or the sprinkling of a little fine powder, is often all that is requisite. Of course, these applications must be varied, according to the particular circumstances of each case.

Buboes are to be treated in the same way as any other inflammatory swellings ; local means being taken at the commencement to subdue the inflammatory action, and resolve the swelling. Rest is indispensable. When they are stationary, the application of a blister will either cause resolution or suppuration, and so the enlargement will be got rid of either in the one way or the other ; when they have passed into a decidedly chronic state, means must be taken to hasten suppuration, and the matter which forms is to be early evacuated. If suppuration occur in the

cellular tissue, and not in the substance of the enlarged gland, cicatrization, and far less a permanent cure, cannot be expected until the prominent and indurated part have been destroyed, as by the caustic potass. In the phagedena, bread and water poultices are, in the first place, to be applied, and the pain and irritation may be soothed by solutions of opium, &c. ; if bands of skin intersect the ulcerated parts, they are to be removed, as being a source of irritation, which prevents healing ; if the frænum præputii be surrounded by ulceration and undermined, it must be divided for a similar reason. After the process of destruction has ceased, gently stimulating washes will promote contraction of the sore. It is an important fact, that all primary ulcers heal without mercury. Cavillers object to the mercurial washes, supposing that they may act by affecting the constitution. The sores with hardened edges, chancres, heal as well as others, when mercury is not employed, but much more slowly. In others the mercury is injurious ; in chancres it promotes the cure. In any case, I would never think of ordering it, unless the cure were very tedious ; then mercury may be advantageously used, and moderately continued, until the callosity disappear. In chancre, as already noticed, mercury proves beneficial in all the stages of the sore ; but, in all others, it can only be of use when the sore, becoming stationary, shows no disposition to contract. Considering that chancres are now very seldom met with, it would seem that very little mercury is required in the treat-

ment of primary venereal sores. Mercury cannot prevent constitutional affections.

Constitutional symptoms do not often occur, taking place scarcely in one case out of a hundred of all the forms of sore seen in this corner of the island. In the *papular* form, mercury is hurtful, as already remarked ; it interferes with the natural and mild progress of the affection, frequently gives rise to iritis, and produces pains of the joints and bones. The powers of the constitution, aided by simple remedies, are sufficient ; the cure may be tedious, but cannot be destructive. Whereas if mercury be considered as the only specific, its use will be long continued ; it will frequently be resumed after it has been dispensed with on the supposition that the virus is destroyed ; and by the effects of excessive mercurial irritation, combined with those of the disease, tampered with and aggravated, the patient may ultimately perish. The fever, which precedes and attends the eruption, must be moderated by depletion, antimonial medicines, and purgatives ; but depletion ought not to be carried far, lest the eruption be checked and disappear ; and the patient ought to be carefully removed from external circumstances which might produce a similar effect. After the eruption has come fully out, and the febrile symptoms subsided, it will be sufficient to attend to the general health, and employ the decoction of sarsaparilla, a medicine which excites all the secretions, and more especially promotes diaphoresis. In short, the treatment may be said to consist in allowing the disease to follow its own course, taking

measures to prevent it from being interrupted, and merely moderating such violent symptoms as may precede or accompany it.

In the *pustular* form of eruption, the general treatment is the same as in the papular. Mercury is hurtful, and increases the tendency to burrow. When the surface is nearly covered with pustules and ulcers in all stages, desquamation may be hastened by fumigations of sulphur, lotions of sulphurate of potass, nitromuriatic baths, vapour baths, or smearing the affected surface with equal parts of tar and sulphur ointment.

In phagedena the patient ought to be, if possible, placed in an airy and healthful situation; in most cases, free blood-letting may be necessary at the commencement, and will be advantageously followed by purgatives and antimonials. The patient ought to be strictly confined to his room, and ordered low diet with diluents. Afterwards, the internal use of nitric acid, the decoction of sarsaparilla, and an occasional dose of Dover's powder at night, will be beneficial, particularly if sleep be disturbed with pain of the bones and joints. Mercury, even in small quantities, protracts the disease, and in large doses it hastens the ulceration and sloughing. When all febrile symptoms have subsided, when the ulcers are nearly healed, when no fresh pustules appear, and when desquamation is begun, alterative doses of mercury, as a blue pill, every second night, will tend to hasten the cure, and will not be followed by any unpleasant symptoms.

In fact, in all scaly eruptions, whether scaly from their commencement, or having become so in their

latter stages and previously to their disappearance, mercury, prudently administered, will be useful by expediting the cure, and not injurious by deranging the system. The tar or citrine ointments may be applied to the eruptions and cutaneous ulcers.

For the ulcers of the throat, unless in a sloughing state, the lunar stone appears to be almost a specific, removing the irritability of the sores, and protecting them from further irritation by coagulating the discharge, which then more effectually covers and protects them; the application requires to be repeated every second or third day, as by the frequent and necessary motions of the parts, the crust loosens and separates, leaving the surface exposed and irritable. At the same time the sore will contract very considerably under each successive crust. The lunar stone may also be applied in solution; or a solution of the muriate of mercury with spirits or laudanum may be used, in the proportion of from four to six grains to the ounce, or stronger. Fumigation of the throat with the red sulphuret of mercury, has been extolled as a powerful means of checking the alternating sloughing and ulceration, which often accompany the ulcers of these parts, but the propriety of its use is doubtful; the system is thereby rapidly put under the influence of mercury, which, as already remarked, generally aggravates the violent disturbance under which the constitution labours. More permanent good may be expected from means taken to remedy the constitutional evils, than from such violent remedies as are directed against the affected part, but which also produce a baneful

effect on the system. In ulcers of the nostrils, with foetid discharge, snivelling, exfoliation of the inferior spongy bones, affections of the palate, &c. the nitrate of silver is also very efficacious, or the affected parts may be occasionally touched with a hair pencil dipped in the linimentum unguenti citrini. They ought to be frequently washed with tepid water, and all sources of irritation must be removed. If the patient be in the habit of taking snuff, the practice must be abandoned, and the powder already impacted in the nostrils removed. If there be carious teeth or stumps in the upper jaw, the sores can scarcely be expected to heal till these be extracted, as by them constant irritation is kept up. When the affection proves obstinate, a recourse to mercury is recommended by some writers, but this will make bad worse. When the phagedenic form prevailed in Portugal, the native practitioners gave no mercury, and their patients returned to health speedily and safely ; but the British soldiers were treated secundum artem, that is by mercury, and most of them survived, to be sure, but deprived of their organs of generation, noses, palates, and other important parts. Sarsaparilla in these cases, with attention to diet and air, will always prove a better alterative than any form of mercury.

The constitutional symptoms of the *scaly* disease, or true pox, when they occur, which is now but seldom, are decidedly benefited by a prudent employment of mercury. It may be administered externally or internally, though the latter method is the one generally adopted. It may be introduced into the

system under various forms, according to the particular circumstances of the case, or the ideas of the practitioner. The most common form, and the simplest, is the pil. hydrargyri, but for this may be substituted hydrargyrum cum creta, Plummer's pill, or calomel with antimony. In painful affections of the bones, with or without swelling, the muriate of mercury is the form which I have found most efficacious ; two pills given thrice a-day, and each containing one-sixteenth of a grain of the muriate ; or the medicine may be given in solution. It is impossible, and would be absurd, to lay down any precise rules as to the quantity of mercury which is necessary for the cure of pox ; in some patients the system is with difficulty put under its influence ; whilst in others, a single grain will produce salivation. When the mouth becomes affected, the mercury ought to be discontinued, much harm and no good resulting from the medicine being pushed to profuse salivation ; the tongue swells hideously, the teeth loosen, and portions of the jaw die and exfoliate. It is sufficient that the system be under the influence of mercury, and that circumstance is marked by the tenderness of the gums. If after the medicine has been disused, the disease does not appear to recede, it may be resumed in the same moderate way as before ; but there certainly can be no use in continuing mercury after the symptoms of venereal affection have ceased. Nodes may still exist, portions of bone may be dying, abscesses forming, and various other changes of structure going on, but these are no reasons for a continuance of the mercury. If they have



originated from the venereal affection, that cause has been removed, and the diseased actions will now proceed altogether independently of their original cause. Mercury proved beneficial in removing a disease of which they are not a part but a consequence ; and if that medicine be now blindly persevered in, the only effect will be to ruin the constitution, and thereby greatly retard the cure of those affections, which, if the natural powers of the system had been merely supported, or in a great measure left to themselves, would have soon ceased to annoy the patient or alarm the antisymphilitic mercurialist.

Slight swellings and pains of the bones often yield to local abstraction of blood, friction, and the internal use of the compound decoction of sarsaparilla. Nodes, however, sometimes continue to enlarge, and occasion much pain, notwithstanding these means; and in such circumstances, much relief will be afforded by a free incision over the affected part, from whatever cause the swelling may proceed. When the pain has subsided, and the swelling remains stationary, a decrease of it may be sometimes effected by a blister.

Of the bad effects of mercury on the constitution, much might be said. Treatises have been written on mercurial pox, a species reported to be much the most violent ; and others have detailed an accumulation of evils, under the title of mercurial disease. There is no doubt that extensive, deep, and sloughy ulcers of the throat are produced by mercury, and of this, I saw the following unexceptionable instance :—The fauces presented one extensive mass of ulceration,

sloughing at its margins, and the uvula was almost detached. The patient was an old and emaciated woman, who neither had, nor could be supposed to have, any venereal complaints. She employed herself in coating mirrors with quicksilver, and to that she ascribed her malady. In fact, her system had been long under mercury, in consequence of her occupation. When I visited her, her daughter and husband, the latter of whom was paralytic, and almost bedridden, were affected, from the same cause, with a pustular eruption of the face, with disease of the nostrils and snivelling. Another old woman had numerous and deep ulcers of the fauces, tongue and lips, having been kept unmercifully under mercury for nine continuous months. She had, besides, taken it from time to time, for upwards of four years, though her sole complaint was slight sore throat. Pains of the joints, too, I believe, are attributable to the use of mercury. That medicine has no power to prevent the occurrence of nodes, for these often form during its action. Affections of the periosteum are easily excited in some people who have neither had pox nor mercury; but in no instance of venereal disease, have I observed serious affections of the bones, where mercury had not been given. Even the advocates for mercurialising speak of mercurial nodes. It has been asserted, that nodes do not occur when mercury has been given for liver or other complaints; but they do form under such circumstances, though not so frequently as when the medicine has been exhibited during venereal symptoms. A cachectic state is often induced by a con-

tinued use of mercurial preparations, or at least by mercury and disease together, in constitutions not originally strong. It is marked by pale lips; bloodless conjunctiva; a rough anserine skin; a relaxed state of the mucous membranes; hæmorrhages from these, particularly from the gums, which may prove fatal, as I have myself witnessed; exfoliations of the alveolar processes; slimy stools; pale urine; pains of the limbs; sores, showing great indolence, or even assuming malignant action; dropsical symptoms, and other evils, of which a lengthened catalogue might be made out. Such symptoms were often met with when mercury was exhibited for every trifling or suspected sign of disease arising from carnal conjunction. On this subject, a modern writer has well remarked, "Experience has fully convinced me, that in no forms of chancre, nor in any other stages of the venereal disease, is it proper to exhibit mercury in the unmerciful quantity, and for the prodigious length of time, which custom, ignorance, and prejudice, used to sanction in former days. Violent salivations ought, at all events, to be for ever exploded. When I was an apprentice at St Bartholomew's Hospital, most of the venereal patients in that establishment were seen with their ulcerated tongues hanging out of their mouths, their faces prodigiously swelled, and their saliva flowing out in streams. The wards were not sufficiently ventilated, and the stench was so great, that the places well deserved the appellation of *foul*. Yet, notwithstanding mercury was thus *pushed*, (as the favourite expression was,) it was then common

to see many patients suffer the most dreadful mutilations, in consequence of sloughing ulcers of the penis; other patients, whose noses and palates were gone; others, who were covered with nodes and dreadful phagedenic sores." This woful picture is not exaggerated, and cannot be too strongly impressed on the minds of young practitioners. A small quantity of mercury will affect violently some constitutions; as of those who have been in warm climates, or who have taken much of the drug, even in this country.

*Eczema Rubrum*, a disease resulting from external causes, but which may also be produced by mercury, often arises from but a small quantity of that medicine. It most frequently infects the scrotum and upper and inner parts of the thighs. It is preceded by heat and itching in the part; a diffused redness appears, and the affected surface is rendered rough by the eruption of numerous minute vesicles. In a short time, these vesicles, if not ruptured, attain the size of a pin's head, and the included serum becomes opaque and milky. The affection soon extends over the rest of the body in successive large patches, and is accompanied with considerable swelling of the integuments, tenderness of the skin, and itching. The vesicles burst, and discharge a thin acrid fluid, which renders the surrounding surface painful, inflamed, and excoriated. The discharge becomes thicker, adhesive, and foetid, and by its drying, partial yellowish incrustations are formed. The disease terminates in desquamation, and in some cases, the hair and nails are

also lost. It is preceded and accompanied with smart fever, and general disorder of the system.

*Erethismus* is another occasional consequence of mercury, characterised by remarkable depression of strength; small, quick, and often unequal pulse; anxiety, sighing, and trembling; a pale contracted countenance, and occasional vomiting. While in this state, sudden exertions are apt to prove fatal.

### *Of Scalds and Burns.*

DIFFERENT degrees of injury are inflicted on the surface from the application of heated solids or fluids. The term scald is generally confined to the effects of heated fluids, whilst burn denotes the consequences of the application of a heated solid, or of ignited combustible matter; the latter class of accidents is, in general, the more serious, yet the former, though not injuring the skin deeply, gives rise to the most alarming symptoms when a large extent of surface is affected. A slight degree of heat is productive only of redness of the surface, with a sharp hot pain, and these symptoms may subside with or without vesication. However, effusion of serum under the cuticle often takes place almost immediately after the contact of the heated body—the cuticle may be destroyed by the intensity of the injury—or the true skin may die, either partially or throughout its whole thickness, and the subjacent parts be at the same time injured to a greater or less depth. But parts,

not severely injured at first, may afterwards perish, violent inflammatory action being excited, which terminates in sloughing. The neighbouring parts have their vitality much diminished, by the direct influence of the injury; and hence, when these parts come to be the seat of increased action, sloughing almost inevitably ensues, from the want of corresponding power. From the same cause, subsequent sores are tedious in healing, being so far debilitated as to be unable to assume full vigour; even slight ulcerations following vesication contract very slowly; the granulations are flabby, and the discharge profuse and thin. The inflammation is often very violent, and kept within bounds with difficulty. Burns of the trunk, particularly of the genital organs, are to be considered as attended with much danger. And extensive burns and scalds, wherever situated, are always to be dreaded. Violent constitutional irritation takes place, dyspnoea is apt to occur, with effusion into the chest of serum, or a sero-purulent fluid; and the nervous system ultimately becomes oppressed. Great sinking of the vital powers is generally the immediate consequence of extensive and severe burns; there is shivering, weakness of the pulse, cold extremities, anxiety, and vomiting, requiring the exhibition of cordials, opium, and even of strong stimulants. Nor can it be matter of surprise that such serious effects occur, when we reflect on the extreme sensibility, and highly organized state of the affected part, and the important functions which it is intended to perform, as well as those sympathies which it holds with

internal parts, on which life principally depends. In trifling burns cold applications are generally used—as immersing the part in cold or iced water. A great variety of remedies are employed, spiritous, watery, acid, alkaline, cold, hot, &c.; in fact, every practitioner, and almost every individual, possesses a favourite application for this so common an accident. Some have recommended holding the part to the fire, or plunging it into hot liquid; but this practice, and all similar, are too severe ever to become general, when milder means prove equally effectual. Perhaps the most common applications are, a mixture of lime-water and olive oil, and the ceratum acetatis plumbi. The vesicles, when left to themselves, burst, expose an irritable surface, and the acrid discharge from them excoriates the surrounding skin. Their contents ought to be evacuated by a small puncture, and the cuticle being left carefully undisturbed, a scab soon forms, by which the part is protected while healing. In extensive injuries of the skin, where the cuticle has been altogether destroyed, finely carded cotton is sometimes applied; it is of use in somewhat the same way as the cuticle in the former instance, and being a sort of cushion over the part, prevents it from being irritated by clothes, or by the patient's resting on it. It soon becomes soaked with the discharge, and must either be frequently changed, or become a receptacle for pus to putrify in, and on account of these circumstances is objectionable. Dusting the part with common flour, or any other fine and dry powder, is

an application equally advantageous, and much more convenient; relief is afforded by its immediate application, the parts are cooled; the flour, absorbing the discharge, is soon formed into crusts, which effectually protect the surface; and the after-secretion readily escapes from beneath this, no more moisture being imbibed than is merely sufficient for the encrustation. The artificial covering ought not to be removed until completely detached, by purulent matter accumulating beneath it; then its presence can be of no service, and its removal is accomplished by fomentation or poultice, and without pain to the patient; whereas, by pulling off the crusts shortly after their formation, as some do, whilst they are adherent to the surface, and protecting it from injury, much pain is given to the patient, the raw surface is irritated, and made liable to overaction, and a useful application is taken away to make room for another exactly similar. After the spontaneous separation, fresh flour may be again sprinkled over the suppurating surface, and, if the affected part is small, it may heal under this application. But when, in burns of considerable extent, suppuration is established, and granulations have begun to arise, lotions or ointments are to be applied, just as to any other granulating sore; and, for the reasons already assigned, the applications require to be of a gently stimulating nature. In severe cases, there is first extreme depression of the powers of life, under which patients sometimes sink; but most frequently this



state is obviated by the employment of cordials or stimulants. But these ought to be administered with caution, for reaction soon commences, and often increases to well-marked inflammation, requiring for counteraction low diet, and even bleeding. In such cases gentle laxatives are preferable to purgatives, as by the latter the patient is obliged to make frequent movements, and those are always painful. Stimulants have been strongly recommended, at first powerful, and afterwards gradually weaker, so as to restore the balance between the affected parts and the system; and the latter is again to be excited, in order to meet the increased action which the parts assume. The practice is founded on fancy, and cannot become general, being in its first part cruel, and in its second foolish. Whilst debility exists, stimulate cautiously, when overaction ensues, adopt those measures which are best calculated to subdue excitement; this is common sense, and the common practice. During the process of healing, position of the parts ought to be carefully attended to; contraction of the cicatrices, and cohesion of opposed surfaces often causing unseemly deformities. Surfaces opposed to each other, and naturally separate, may be prevented from uniting by dressing interposed; and contraction of joints is to be guarded against by keeping the limb extended by splints and bandages. Where deformity has occurred, the hardened cicatrix which is in fault may be either divided or excised, and by approximating the edges of the wound as much as possible, and

paying attention to position in the after treatment, the evil may be greatly lessened. In the case of contracted joints, it is generally necessary to excise the whole or greater part of the callous web; in other situations, simple division may be sufficient.

END OF PART FIRST.



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